IEI Technology Corp.

# PICOe-9452

## Socket 479 Intel® Core™2 Duo Half-size CPU Card

## DDR2, SATA II, Dual PCIe GbE, PCIe Expansion

# User Manual

Rev.1.0, April, 2007

RoHS Lead Free

# Revision

| Date | Version | Changes |
|---|---|---|
| 2007-04-02 | 1.00 | Initial release |

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# Packing List

**NOTE:**

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the PICOe-9452 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

The items listed below should all be included in the PICOe-9452 package.

- 1 x PICOe-9452 single board computer
- 1 x IDE cable
- 1 KB/MS PS/2 Y-cable
- 1 x SATA power cable
- 2 x SATA cables
- 1 x Dual RS-232 cable
- 1 x Dual USB cable
- 1 x Mini jumper pack
- 1 x Utility CD
- 1 x QIG (quick installation guide)

Images of the above items are shown in **Chapter 3**.

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# Glossary

| | |
|---|---|
| AC ’97 | Audio Codec 97 |
| ACPI | Advanced Configuration and Power Interface |
| APM | Advanced Power Management |
| ARMD | ATAPI Removable Media Device |
| ASKIR | Shift Keyed Infrared |
| ATA | Advanced Technology Attachments |
| BIOS | Basic Input/Output System |
| CFII | Compact Flash Type 2 |
| CMOS | Complementary Metal Oxide Semiconductor |
| CPU | Central Processing Unit |
| Codec | Compressor/Decompressor |
| COM | Serial Port |
| DAC | Digital to Analog Converter |
| DDR | Double Data Rate |
| DIMM | Dual Inline Memory Module |
| DIO | Digital Input/Output |
| DMA | Direct Memory Access |
| EIDE | Enhanced IDE |
| EIST | Enhanced Intel SpeedStep Technology |
| FDD | Floppy Disk Drive |
| FDC | Floppy Disk Connector |
| FFIO | Flexible File Input/Output |
| FIFO | First In/First Out |
| FSB | Front Side Bus |
| IrDA | Infrared Data Association |
| HDD | Hard Disk Drive |
| IDE | Integrated Data Electronics |
| I/O | Input/Output |
| ICH4 | I/O Controller Hub 4 |
| L1 Cache | Level 1 Cache |
| L2 Cache | Level 2 Cache |
| LCD | Liquid Crystal Display |
| LPT | Parallel Port Connector |
| LVDS | Low Voltage Differential Signaling |
| MAC | Media Access Controller |
| OS | Operating System |
| PCI | Peripheral Connect Interface |
| PIO | Programmed Input Output |
| PnP | Plug and Play |
| POST | Power On Self Test |
| RAM | Random Access Memory |
| SATA | Serial ATA |
| S.M.A.R.T | Self Monitoring Analysis and Reporting Technology |
| SPD | Serial Presence Detect |
| S/PDI | Sony/Philips Digital Interface |
| SDRAM | Synchronous Dynamic Random Access Memory |
| SIR | Serial Infrared |
| UART | Universal Asynchronous Receiver-transmitter |
| USB | Universal Serial Bus |
| VGA | Video Graphics Adapter |

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Chapter

1

# Introduction

## 1.1 Introduction

The half-size PICOe-9452 CPU card is a Socket 479 Intel® Core™2 Duo, Intel® Core™ Duo, Intel® Core™ Solo or Intel® Celeron M (Yohan core) CPU platform. The PICOe-9452 has a maximum front side bus (FSB) frequency of 667MHz and supports 667MHz 2GB dual channel memory modules. The PICOe-9452 also comes with multiple display options, dual PCI Express (PCIe) Gigabit Ethernet (GbE) and has flexible storage options including support for two second-generation serial ATA (SATA) hard disk drives (HDD), two IDE HDD and a CompactFlash® Type II (CF Type II) disk.

### 1.1.1 PICOe-9452 Benefits

Some of the PICOe-9452 benefits are listed below:

- Multiple display output options
- Storage flexibility with support for SATA II drives, IDE drives and CompactFlash (CF) disks
- DDR2 support enables faster data transfers
- Multiple I/O interfaces provide connectivity to a broad range of external peripheral devices

### 1.1.2 PICOe-9452 Features

Some of the PICOe-9452 features are listed below.

- Support for the following Socket 479 processors:
  - Intel® Core™2 Duo
  - Intel® Core™ Duo
  - Intel® Core™ Solo
  - Intel® Celeron® M
- Maximum FSB of 667MHz
- Maximum of 4GB of memory supported with two 240-pin dual channel 400MHz, 533MHz or 667MHz 2GB DDR2 DIMMs
- Two SATA II drives with transfer rates of 3.0Gb/s supported
- Two Ultra ATA 100, Ultra ATA 66 or Ultra ATA 33 IDE HDDs supported
- Five USB 2.0 devices supported

- Dual PCIe GbE Ethernet connectivity
- Multiple display options including CRT,HDTV and dual-channel LVDS
- Half-size form factor
- RoHS compliant
- Supports AT and ATX power supplies

## 1.2 PICOe-9452 Overview

### 1.2.1 PICOe-9452 Overview Photo

The PICOe-9452 has a wide variety of internal and external peripheral connectors. A labeled photo of the peripheral connectors on the front of the PICOe-9452 is shown in **Figure 1-1**.

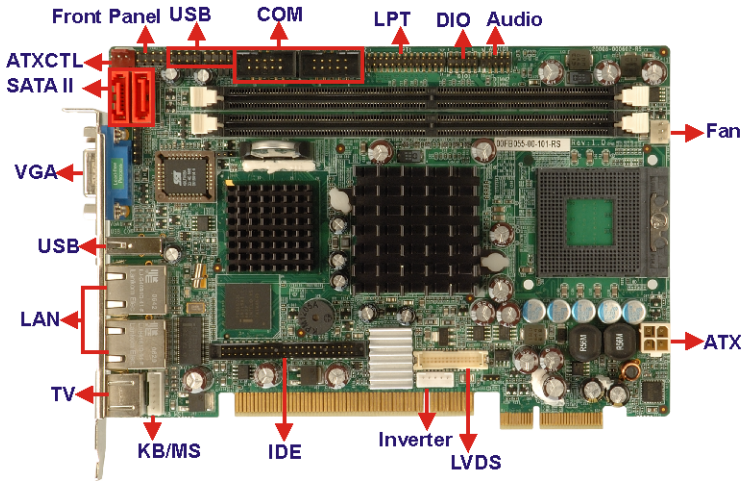


**Figure 1-1: PICOe-9452 Overview [Front View]**

A labeled photo of the peripheral connectors on the back of the PICOe-9452 is shown in **Figure 1-1**.

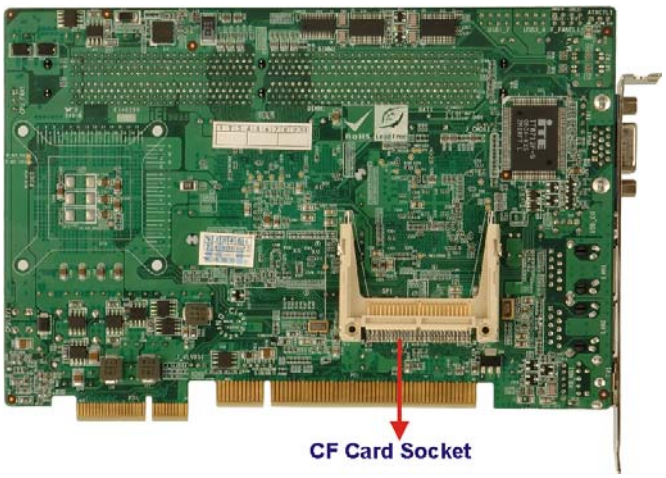


**Figure 1-2: PICOe-9452 Overview [Rear View]**

### 1.2.2 PICOe-9452 Peripheral Connectors and Jumpers

The PICOe-9452 has the following connectors on-board:

- 1 x Audio connector
- 1 x Backplane power connector
- 1 x Compact flash connector
- 1 x Digital input/output connector
- 1 x Fan connector
- 1 x Front panel connector
- 1 x IDE disk drive connector
- 1 x Infrared interface connector
- 1 x Inverter connector
- 1 x Keyboard and mouse connector
- 1 x LVDS connector
- 2 x Serial port connectors (internal COM 1 and COM 2 RS-232)
- 1 x Parallel port connector
- 2 x Serial ATA (SATA) drive connectors
- 2 x USB connectors

The PICOe-9452 has the following external peripheral interface connectors on the board rear panel

- 2 x Ethernet connectors
- 1 x USB port connectors
- 1 x TV Out Mini DIN connector
- 1 x VGA connector

The PICOe-9452 has the following on-board jumpers:

- Clear CMOS
- CF Card setup
- LVDS voltage selection

### 1.2.3 Technical Specifications

PICOe-9452 technical specifications are listed in **Table 1-1**. See **Chapter 2** for details.

| Specification | PICOe-9452 |
|---|---|
| **Form Factor** | Half-size |
| **System CPU** | Socket 479 Intel® Core™2 Duo<br>Socket 479 Intel® Core™ Duo<br>Socket 479 Intel® Core™ Solo<br>Socket 479 Intel® Celeron M (Yonah core) |
| **Front Side Bus** | 400MHz, 533Mhz, or 667MHz |
| **System Chipset** | **Northbridge**: Intel® 945GM<br>**Southbridge**: Intel® ICH7-M |
| **Memory** | Two 240-pin DIMM sockets support two dual-channel 400MHz, 533MHz or 667MHz DDR2 DIMMs with a maximum capacity of 2GB each |
| **Display** | **CRT**: Integrated in the Intel® 945GM to support CRT<br>**LVDS**: Dual channel 18-bit LVDS LCD panel<br>**HDTV**: Supported by component interface |

| Specification | PICOe-9452 |
|---|---|
| **BIOS** | AMI Flash BIOS |
| **Audio** | 7.1 channel or 5.1 channel audio with an optional AC-KIT |
| **LAN** | Intel® 82573 PCIe GbE chipset<br>Intel® 82562 Ethernet chipset |
| **COM** | Two RS-232 serial ports |
| **USB2.0** | Four USB 2.0 devices supported |
| **IDE** | One 44-pin IDE connects to two Ultra ATA33/66/100 devices |
| **SATA** | Two 3.0Gb/s SATA drives supported |
| **Keyboard/Mouse** | One 6-pin connector connects to a keyboard |
| **Super I/O** | ITE IT8712FHX |
| **Digital I/O** | One 8-bit digital I/O connector (4-bit input / 4-bit output) |
| **Infrared** | One Infrared connector |
| **SSD** | CF Type II |
| **Watchdog Timer** | Software programmable 1-255 sec. by super I/O |
| **Power Supply** | AT and ATX supported |
| **Temperature** | 0ºC – 60ºC (32ºF - 140ºF) |
| **Humidity (operating)** | 5%~95% non-condensing |
| **Dimensions (LxW)** | 185mm x 122mm |
| **Weight (GW/NW)** | 1000g/ 171g |

**Table 1-1: Technical Specifications**

Chapter

2

# Detailed Specifications

## 2.1 Overview

This chapter describes the specifications and on-board features of the PICOe-9452 in detail.

## 2.2 Dimensions

### 2.2.1 Board Dimensions

The dimensions of the board are listed below:

- **Length**: 185mm
- **Width**: 122mm

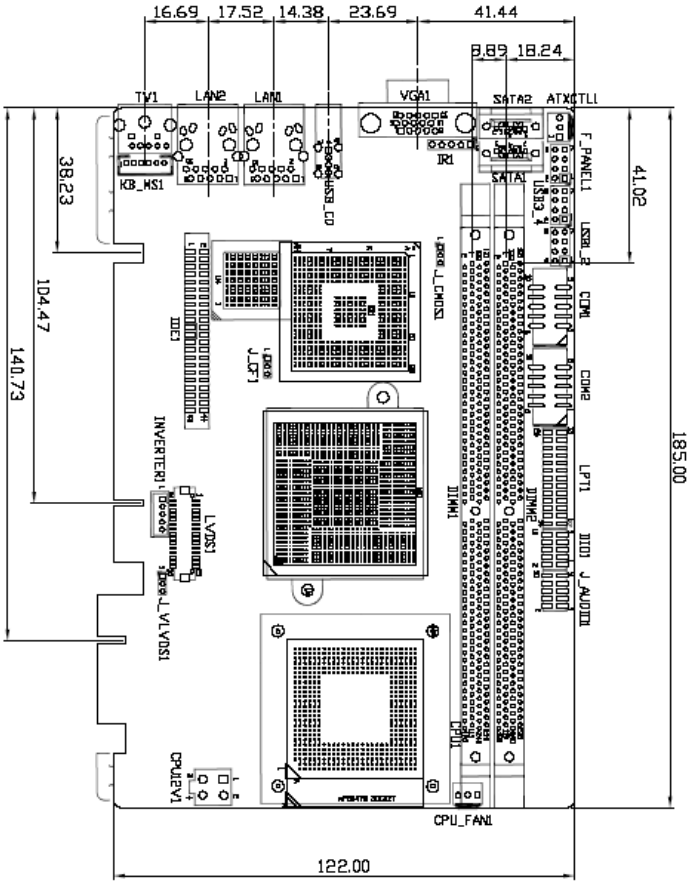


**Figure 2-1: PICOe-9452 Dimensions (mm)**

### 2.2.2 External Interface Panel Dimensions

External peripheral interface connector panel dimensions are shown in **Figure 2-2**.

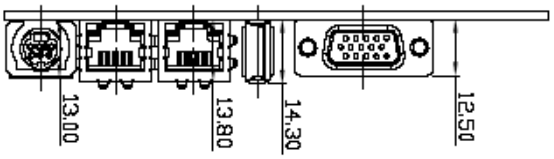


**Figure 2-2: External Interface Panel Dimensions (mm)**

## 2.3 Data Flow

**Figure 2-3** shows the data flow between the two on-board chipsets and other components installed on the motherboard and described in the following sections of this chapter.

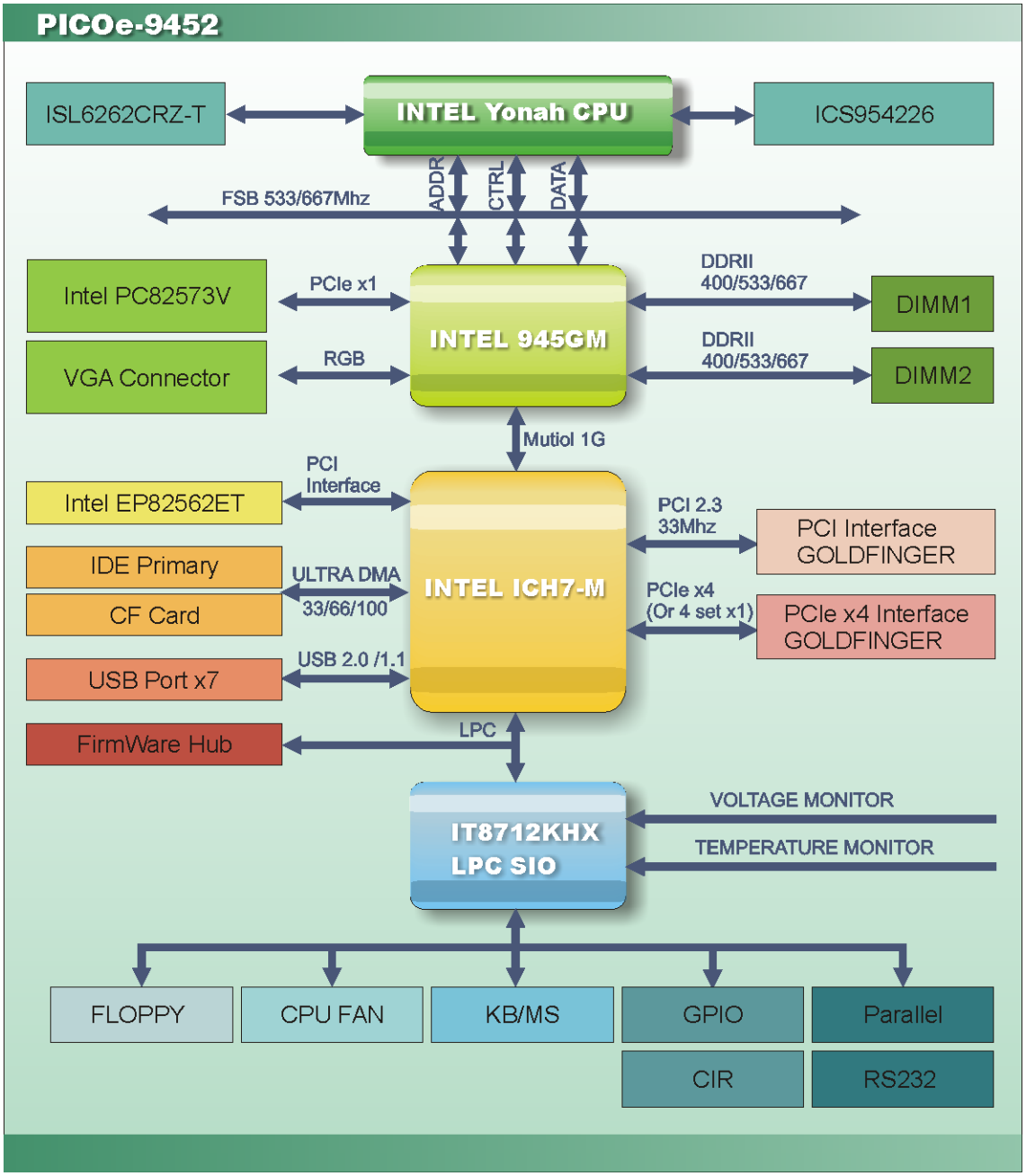


**Figure 2-3: Data Flow Block Diagram**

## 2.4 Compatible Processors

### 2.4.1 Compatible Processor Overview

The PICOe-9452 supports the following socket 479 processors:

- Intel® Core™2 Duo Mobile processors
- Intel® Core™ Duo processors
- Intel® Core™ Solo processors
- Intel® Celeron® M processors

All three of the above processors communicate with the Intel® 945GM northbridge chipset through a 667MHz front side bus (FSB). Features of the supported processors are listed in **Table 2-1**.

| CPU Features | Core™2 Duo Mobile | Core™ Duo | Core™ Solo | Celeron® M |
|---|---|---|---|---|
| Dual core | Yes | Yes | No | No |
| Enhanced Halt State (C1E) | No | Yes | No | No |
| Enhanced Intel® Speedstep® Technolgy | Yes | Yes | Yes | No |
| Execute Disable Bit | Yes | Yes | Yes | Yes |
| Intel® EM64T | Yes | No | No | No |
| Intel® Virtualization Technology | Yes | Yes | No | No |

**Table 2-1: Processor Features**

### 2.4.2 Supported Processors

Specifications for the compatible processors are listed in **Table 2-2** below:

| Family | CPU Speed | Processor # | Bus Speed | Mfg Tech | Stepping | Cache Size |
|---|---|---|---|---|---|---|
| Core™2 Duo Mobile | 2.33 GHz | T7600 | 667 MHz | 65 nm | B2 | 4 MB |
| | 2.16 GHz | T7400 | 667 MHz | 65 nm | B2 | 4 MB |

| Family | CPU Speed | Processor # | Bus Speed | Mfg Tech | Stepping | Cache Size |
|---|---|---|---|---|---|---|
| | 2 GHz | T7200 | 667 MHz | 65 nm | B2 | 4 MB |
| | 1.83 GHz | T5600 | 667 MHz | 65 nm | B2 | 2 MB |
| | 1.66 GHz | T5500 | 667 MHz | 65 nm | B2 | 2 MB |
| Core™ Duo | 2 GHz | T2500 | 667 MHz | 65 nm | C0 | 2 MB |
| | 1.66 GHz | T2300E | 667 MHz | 65 nm | C0 | 2 MB |
| Core™ Solo | 1.83 GHz | T1400 | 667 MHz | 65 nm | C0 | 2 MB |
| Celeron® M | 2 GHz | 450 | 533 MHz | 65 nm | D0 | 1 MB |
| | 1.86 GHz | 440 | 533 MHz | 65 nm | D0 | 1 MB |
| | 1.73 GHz | 430 | 533 MHz | 65 nm | C0 | 1 MB |
| | 1.73 GHz | 430 | 533 MHz | 65 nm | D0 | 1 MB |
| | 1.73GHz | 530 | 533 MHz | 65 nm | - | 1 MB |
| | 1.60 GHz | 520 | 533 MHz | 65 nm | B2 | 1 MB |
| | 1.46 GHz | 410 | 533 MHz | 65 nm | C0 | 1 MB |

**Table 2-2: Supported Processors**

## 2.5 Intel® 945GM Northbridge Chipset

### 2.5.1 Intel® 945GM Overview

The Intel® 945GM northbridge chipset has the Generation 3.1 Intel Integrated Graphics Engine and the Intel® Graphics Media Accelerator 950 (Intel® GMA 950). The integrated graphics and memory controller hub (GMCH) facilitates the flow of information primarily between the following four interfaces:

- Front Side Bus (FSB)
- System Memory Interface
- Graphics Interface
- Direct Media Interface (DMI)

### 2.5.2 Intel® 945GM Memory Support

**WARNING:**

Only DDR2 memory module can be installed on the PICOe-9452. Do not install DDR memory modules. If a DDR memory module is installed on the PICOe-9452, the PICOe-9452 may be irreparably damaged.

The Intel® 945GM northbridge chipset on the PICOe-9452 supports two DDR2 240-pin DIMMs with the following features:

- Two 240-pin DIMMs
- DDR2 only (**DO NOT** install a DDR DIMM)
- Single-channel or dual-channel
- Capacities of 256MB, 512MB, 1GB or 2GB
- Transfer speeds of 400MHz, 533MHz or 667MHz
- 64-bit wide channel

The memory socket is shown in **Figure 2-4**.

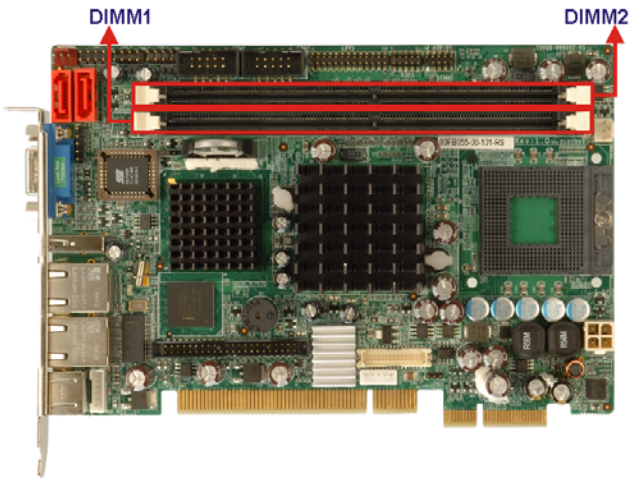


**Figure 2-4: 240-pin DDR2 DIMM Sockets**

### 2.5.3 Intel® 945GM PCIe x1 Bus: PCIe GbE Ethernet Controller

One lane of the PCIe (PCIe x1) bus on the Intel® 945GM northbridge chipset is interfaced to an external RJ-45 LAN connector (LAN1) through an Intel® PC82573V PCIe GbE controller. The PCIe GbE controller and the LAN1 RJ-45 connector are shown in **Figure 2-5**. For more detailed information about the Intel® PC82573V PCIe GbE controller, please refer to Section below.

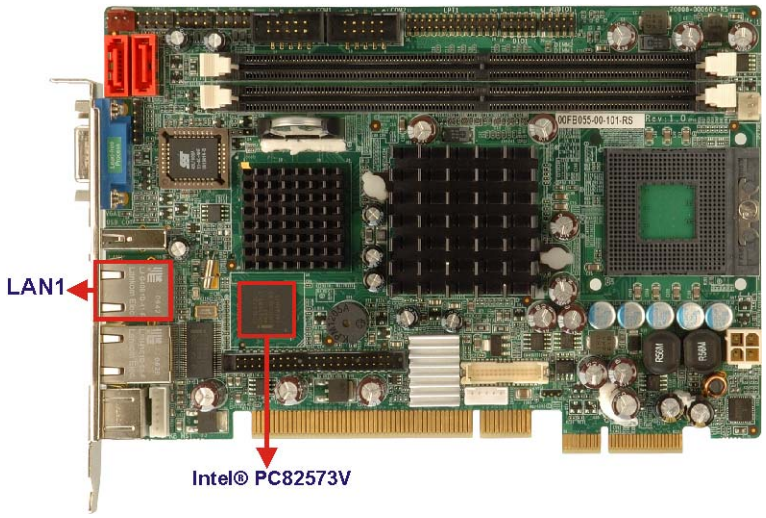


**Figure 2-5: PCIe GbE LAN Chipset and Connector**

### 2.5.4 Intel® 945GM Integrated Graphics

The Intel® 945GM northbridge chipset has an Intel® Gen. 3.5 integrated graphics engine that supports the following display devices:

- Analog CRT
- LVDS
- TV-Out
- S-DVO ports

#### 2.5.4.1 Intel® 945GM Analog CRT Support

A DB-15 VGA connector on the external peripheral interface connector panel is interfaced to the Intel® 945GM graphics engine. The Intel® 945GM internal graphics engine, with an

integrated 400MHz RAMDAC and hot plug CRT support, supports analog CRT monitors up to QXGA.

### 2.5.4.2 Intel® 945GM LVDS Support

A 30-pin LVDS crimp connector is interfaced to the Intel® 945GM graphics engine. The Intel® 945GM internal graphics engine supports LVDS displays with the following features:

- Up to UXGA monitors with a maximum resolution of 1600 x 1200
- 18-bit 25MHz to 112MHz single-channel or dual-channel LVDS screens
- CPIS 1.5 compliant LVDS screens

### 2.5.4.3 Intel® 945GM TV Out Support

An external 7-pin DIN TV output connector is interfaced to the Intel® 945GM graphics engine. The Intel® 945GM internal graphics engine has the following TV output features:

- Three integrated 10-bit DACs
- Macrovision support
- Overscaling
- NTSC and PAL formats supported
- Supports RCA or S-VIDEO connectivity
- Supports HDTV with the following resolutions:
  - 480p
  - 720p
  - 1080i
  - 1080p

### 2.5.4.4 Intel® 945GM SDVO Support

The Intel® 945GM internal graphics engine has the following SDVO output features:

- Concurrent operation of PCIe x 1 with SDVO
- Two SDVO ports supported
  - SDVO is muxed onto the PCIe pins
  - DVI 1.0 support for external digital monitor

- Only Downstream HDCP support
- Supports TV and DVD formats
- Display hot plug support

### 2.5.5 Intel® 945GM Direct Media Interface (DMI)

Intel® 945GM northbridge GMCH is connected to the Intel® ICH7-M Southbridge Chipset through the chip-to-chip Direct Media Interface (DMI). Features of the Intel® 945GM DMI are listed below:

- 2GB/s (1GB/s in each direction) bus speed
- 32-bit downstream address

## 2.6 Intel® ICH7-M Southbridge Chipset

### 2.6.1 Intel® ICH7-M Overview

The Intel® ICH7-M southbridge chipset is connected to the Intel® 945GM northbridge GMCH through the chip-to-chip Direct Media Interface (DMI). Some of the features of the Intel® ICH7-M are listed below.

- Complies with PCI Express Base Specification, Revision 1.0a
- Complies with PCI Local Bus Specification, Revision 2.3 and supports 33MHz PCI operations
- Supports ACPI Power Management Logic
- Contains:
  - Enhanced DMA controller
  - Interrupt controller
  - Timer functions
- Integrated SATA host controller with DMA operations interfaced to four SATA connectors on the PICOe-9452
- Integrated IDE controller supports Ultra ATA 100/66/33
- Supports the four USB 2.0 devices on the PICOe-9452 with four UHCI controllers and one EHCI controller
- Complies with System Management Bus (SMBus) Specification, Version 2.0
- Supports Audio Codec ’97 (AC’97) Revision 2.3

- Supports Intel® High Definition Audio
- Contains Low Pin Count (LPC) interface
- Supports Firmware Hub (FWH) interface
- Serial peripheral interface support

### 2.6.2 Intel® ICH7-M Audio Codec ’97 Controller

The Audio Codec ’97 (AC’97) controller integrated into the ICH7-M complies with AC’97 Component Specification, Version 2.3. The AC’97 controller is connected to the onboard audio connector. The audio connector is connected to an optional 5.1 channel or 7.1 channel audio kit with an embedded AC’97 audio codec. The AC’97 controller supports up to six PCM audio output channels. Complete surround sound requires six-channel audio consisting of:

- Front left
- Front right
- Back left
- Back right
- Center
- Subwoofer

### 2.6.3 Intel® ICH7-M Ethernet Connection

An integrated PHY on the Intel® ICH7-M southbridge is interfaced to an Intel® EP82562ET 10Mbps or 100Mbps Ethernet controller. The Intel® EP82562ET controller is then connected to the LAN2 RJ-45 connector. See **Figure 2-6** below. For more details on the Intel® EP82562ET controller, please see below.

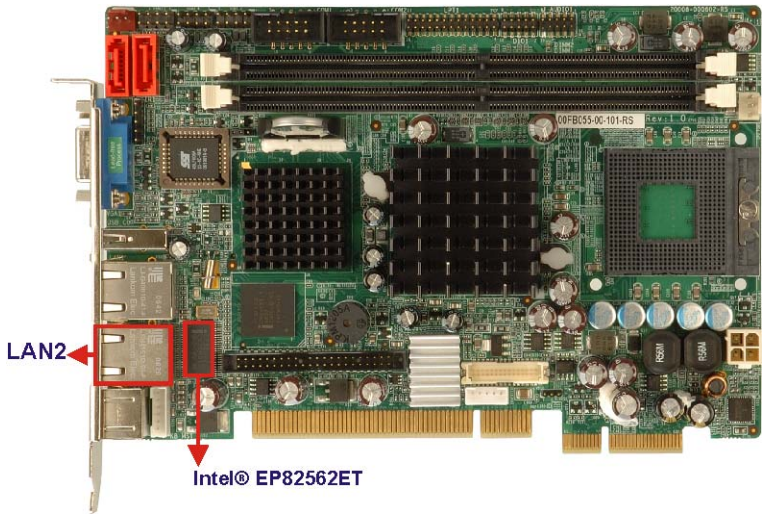


**Figure 2-6: 10Mbps or 100Mbps LAN Controller Chipset and Connector**

### 2.6.4 Intel® ICH7-M IDE Interface

The integrated IDE interface on the ICH7-M southbridge supports two IDE hard disks and ATAPI devices. PIO IDE transfers up to 16MB/s and Ultra ATA transfers of 100MB/s. The integrated IDE interface is able to support the following IDE HDDs:

- **Ultra ATA/100**, with data transfer rates up to 100MB/s
- **Ultra ATA/66**, with data transfer rates up to 66MB/s
- **Ultra ATA/33**, with data transfer rates up to 33MB/s

| Specification | Ultra ATA/100 | Ultra ATA/66 | Ultra ATA/100 |
|---|---|---|---|
| IDE devices | 2 | 2 | 2 |
| PIO Mode | 0 – 4 | 0 – 4 | 0 – 4 |
| PIO Max Transfer Rate | 16.6 MB/s | 16.6 MB/s | 16.6 MB/s |
| DMA/UDMA designation | UDMA 3 - 4 | UDMA 3 – 4 | UDMA 2 |
| DMA/UDMA Max Transfer | 100MB/s | 66MB/s | 33MB/s |
| Controller Interface | 5V | 5V | 5V |

**Table 2-3: Supported HDD Specifications**

### 2.6.5 Intel® ICH7-M Low Pin Count (LPC) Interface

The ICH7-M LPC interface complies with the LPC 1.1 specifications. The LPC bus from the ICH6 is connected to the following components:

- BIOS chipset
- Super I/O chipset

### 2.6.6 Intel® ICH7-M PCI Interface

The PCI interface on the ICH7-M is compliant with the PCI Revision 2.3 implementation. Some of the features of the PCI interface are listed below.

- PCI Revision 2.3 compliant
- 33MHz
- 5V tolerant PCI signals (except PME#)
- Integrated PCI arbiter supports up to seven PCI bus masters

The PCI bus is connected to an interface gold finger on the bottom of the CPU cards and supports four expansion PCI cards on the backplane.

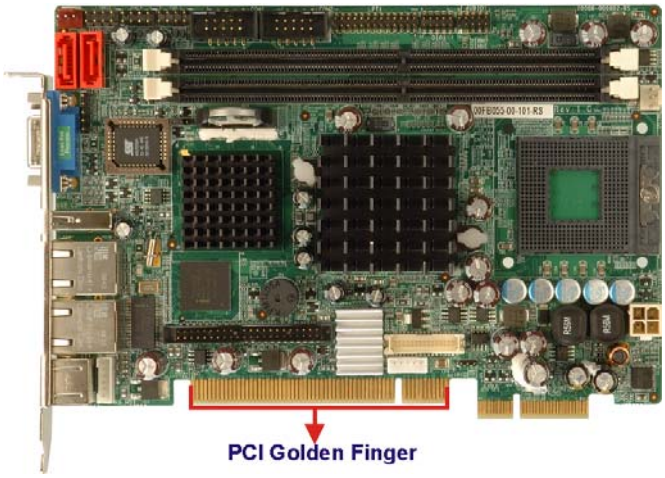


**Figure 2-7: PCI Golden finger**

### 2.6.7 Intel® ICH7-M PCIe x4 Bus

The Intel® ICH7-M southbridge chipset has four PCIe lanes. The four PCIe lanes are interfaced through a golden finger on the bottom of the CPU card through a compatible half-size backplane to either four PCIe x1 expansion cards or one PCIe x4 expansion card on. The PCIe x4 golden finger is shown in **Figure 2-8** below.

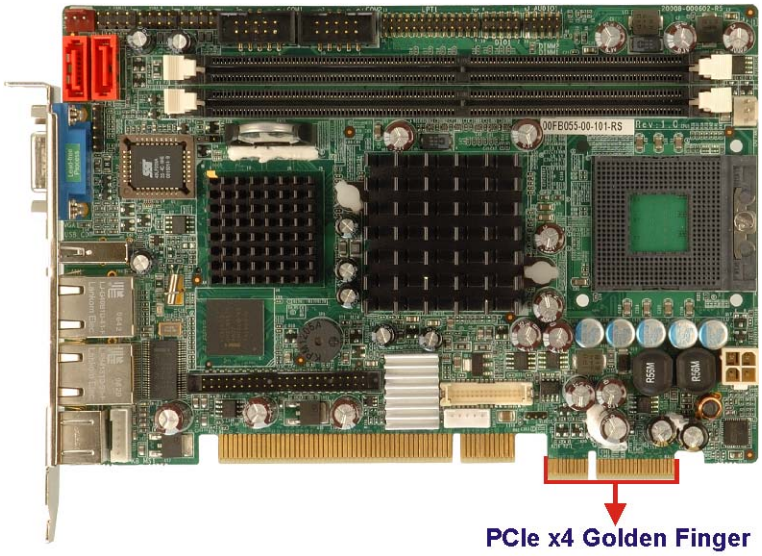


**Figure 2-8: PCIe x4 Golden finger**

### 2.6.8 Intel® ICH7-M Real Time Clock

256 bytes of battery backed RAM is provided by the Motorola MC146818A real time clock (RTC) integrated into the ICH6. The RTC operates on a 3V battery and 32.768KHz crystal. The RTC keeps track of the time and stores system data even when the system is turned off.

### 2.6.9 Intel® ICH7-M SATA Controller

The integrated SATA controller on the ICH7-M southbridge supports four SATA drives on the PICOe-9452 with independent DMA operations. SATA controller specifications are listed below.

- Supports four SATA drives

- Supports 3Gb/s data transfer speeds
- Supports Serial ATA Specification, Revision 1.0a

### 2.6.10 Intel® ICH7-M USB Controller

Up to five high-speed, full-speed or low-speed USB devices are supported by the ICH7-M on the PICOe-9452. High-speed USB 2.0, with data transfers of up to 480MB/s, is enabled with the ICH7-M integrated Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling is supported by the ICH7-M integrated Universal Host Controller Interface (UHCI) controllers.

The five USB ports implemented on the PICOe-9452 are connected to two internal connectors and one external connector. See **Figure 2-9**.

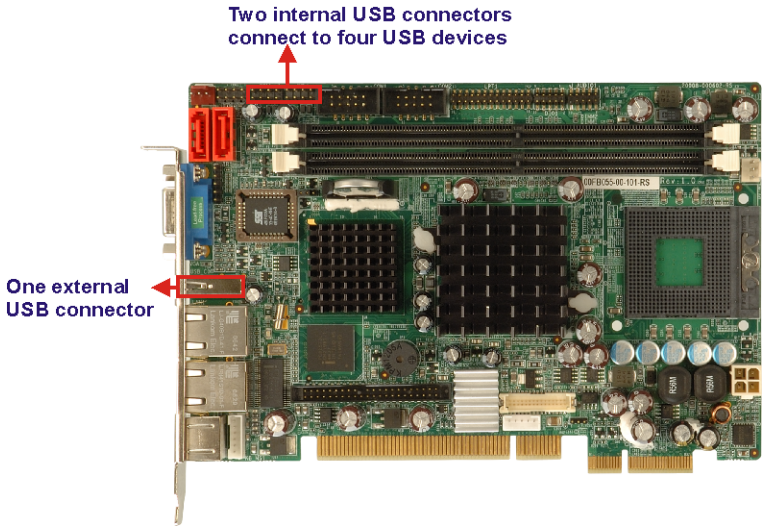


**Figure 2-9: Onboard USB Implementation**

## 2.7 LPC Bus Components

### 2.7.1 LPC Bus Overview

The LPC bus is connected to components listed below:

- BIOS chipset
- Super I/O chipset

The BIOS chipset and Super I/O chipset are shown in **Figure 2-10** below.

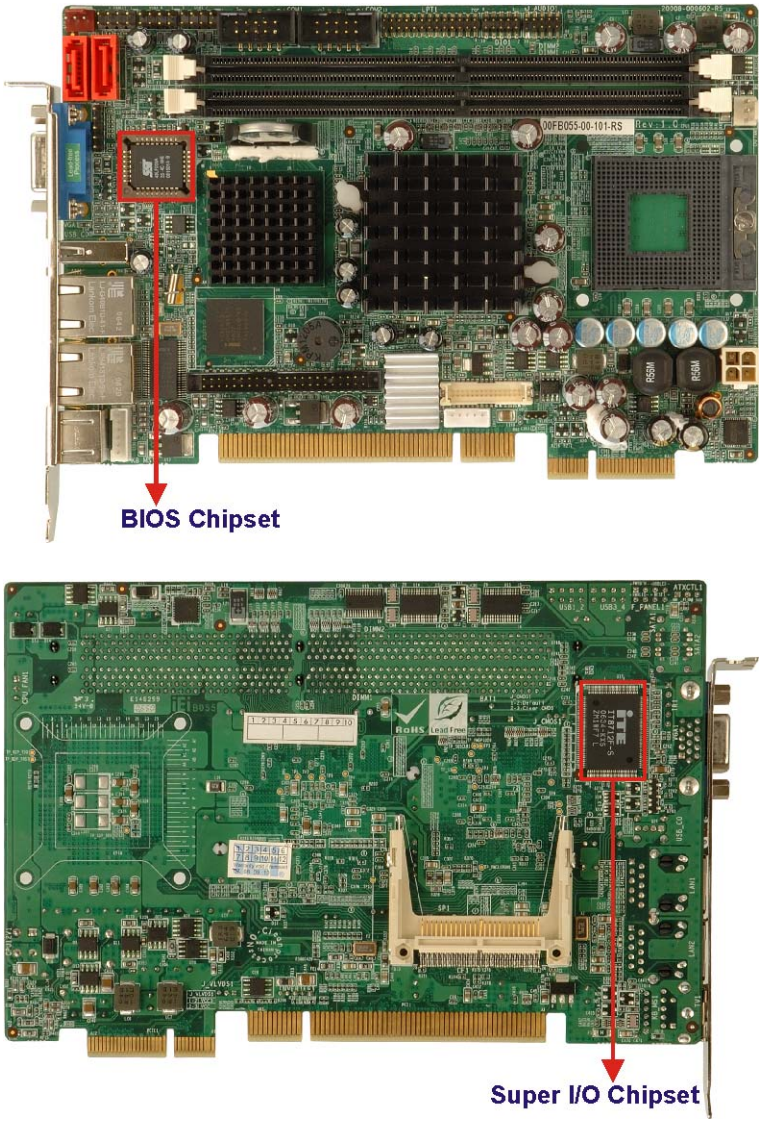


**Figure 2-10: LPC Bus Components**

## 2.7.2 BIOS Chipset

The BIOS chipset has a licensed copy of AMI BIOS installed on the chipset. Some of the BIOS features are listed below:

- AMI Flash BIOS
- SMIBIOS (DMI) compliant

- Console redirection function support
- PXE (Pre-boot Execution Environment) support
- USB booting support

### 2.7.3 Super I/O chipset

The iTE IT8712F Super I/O chipset is connected to the Intel® ICH7-M southbridge through the LPC bus. The iTE IT8712F is an LPC interface-based Super I/O device that comes with Environment Controller integration. Some of the features of the iTE IT8712F chipset are listed below:

- LPC Interface
- PC98/99/2001, ACPI and LANDesk Compliant
- Enhanced Hardware Monitor
- Fan Speed Controller
- SmartGuardian Controller
- Single +5V Power Supply
- Two 16C550 UARTs for serial port control
- One IEEE 1284 Parallel Port
- Floppy Disk Controller
- Keyboard Controller
- Watchdog Timer
- Serial IRQ Support
- Vbat & Vcch Support
- Single +5V Power Supply

Some of the Super I/O features are described in more detail below:

#### 2.7.3.1 Super I/O LPC Interface

The LPC interface on the Super I/O complies with the Intel® Low Pin Count Specification Rev. 1.0. The LPC interface supports both LDRQ# and SERIRQ protocols as well as PCI PME# interfaces.

### 2.7.3.2 Super I/O 16C550 UARTs

The onboard Super I/O has two integrated 16C550 UARTs that can support the following:

- Two standard serial ports (COM1 and COM2)
- IrDa 1.0 and ASKIR protocols

### 2.7.3.3 Super I/O Enhanced Hardware Monitor

The Super I/O Enhanced Hardware Monitor monitors three thermal inputs, VBAT internally, and eight voltage monitor inputs. These hardware parameters are reported in the BIOS and can be read from the BIOS Hardware Health Configuration menu.

### 2.7.3.4 Super I/O Fan Speed Controller

The Super I/O fan speed controller enables the system to monitor the speed of the fan. One of the pins on the fan connector is reserved for fan speed detection and interfaced to the fan speed controller on the Super I/O. The fan speed is then reported in the BIOS.

### 2.7.3.5 Super I/O Parallel Port

The Super I/O parallel port (LPT) supports standard mode, enhanced mode and high-speed mode parallel port devices. The LPT is compliant with the following LPT modes.

- Standard mode
  - Bi-directional SPP compliant
- Enhanced mode
  - EPP v1.7 compliant
  - EPP v1.9 compliant
- High-speed mode
  - ECP, IEEE 1284 compliant

### 2.7.3.6 Super I/O Keyboard/Mouse Controller

The Super I/O keyboard/mouse controller can execute the 8042 instruction set. Some of the keyboard controller features are listed below:

- The 8042 instruction is compatible with a PS/2 keyboard and PS/2 mouse
- Gate A20 and Keyboard reset output
- Supports multiple keyboard power on events
- Supports mouse double-click and/or mouse move power on events

## 2.8 Ethernet LAN Controllers

### 2.8.1 Ethernet LAN Controllers Overview

As described above (see **Section 0** and **Section 2.6.3**), the PICOe has two Ethernet controllers, the Intel® PC82573V and the Intel® EP82562ET. These two LAN controllers are described below.

### 2.8.2 Intel® PC82573V PCIe GbE Ethernet Controller

#### 2.8.2.1 Intel® PC82573V Overview

The Intel® PC82573V is a PCIe GbE Ethernet controller that interfaces the Intel® 945GM northbridge chipset to the LAN1 RJ-45 connector. The Intel® 82573 Gigabit Ethernet Controller provides a standard IEEE 802.3 Ethernet interface for 1000BASE-T, 100BASE-TX, and 10BASE-T applications (802.3, 802.3u, and 802.3ab, respectively).

- 2 Gbps peak bandwidth per direction
- PCI Express Rev 1.0a specification
- High bandwidth density per pin
- Wide, pipelined internal data path architecture
- Optimized transmit (Tx) and receive (Rx) queues
- 32 KB configurable Rx and Tx first-in/first-out (FIFO)
- IEEE 802.3x*-compliant flow-control support with software controllable pause times and threshold values
- Programmable host memory Rx buffers (256 B-16 KB)
- Descriptor ring management hardware for Tx and Rx
- Mechanism for reducing interrupts from Tx/Rx operations
- Integrated PHY for 10/100/1000 Mbps (full- and half-duplex)
- IEEE 802.3ab* auto-negotiation support
- IEEE 802.3ab PHY compliance and compatibility

- Tx/Rx IP, TCP, and UDP checksum offloading
- Tx TCP segmentation
- Advanced packet filtering
- Intel® SingleDriver™ technology
- Alerting Standards Format 2.0 (82573V only)
- Advanced Pass Through (82573V only)
- Boot ROM Preboot eXecution Environment (PXE) Flash interface support
- SDG 3.0, WfM 3.0 and PC2001 compliant
- Wake on LAN support

### 2.8.3 Intel® EP82562ET PCIe GbE Ethernet Controller

#### 2.8.3.1 Intel® EP82562ET Overview

The Intel® 82562ET is an IEEE 10BASE-T and 100BASE-TX Ethernet controller that connects the Intel® ICH7-M southbridge chipset to the LAN2 RJ-45 connector. The Intel® 82562ET is designed for 10Mbps or 100Mbps Ethernet systems.

#### 2.8.3.2 Intel® EP82562ET Ethernet Controller

Some features of the Intel® EP82562ET Ethernet controller are written below:

- IEEE 802.3 10BASE-T/100BASE-TX compliant physical layer interface
- IEEE 802.3u Auto-Negotiation support
- Digital Adaptive Equalization control
- Link status interrupt capability
- XOR Tree mode support for board testing
- 3-port LED support (speed, link and activity)
- 10BASE-T auto-polarity correction
- Diagnostic loopback mode
- 1:1 transmit transformer ratio support
- Low power (less than 300 mW in active transmit mode)
- Reduced power in “unplugged mode” (less than 50 mW)
- Automatic detection of “unplugged mode”
- 3.3 V device
- 48-pin Shrink Small Outline Package

- Platform LAN connect interface support

## 2.9 Environmental and Power Specifications

### 2.9.1 System Monitoring

Three thermal inputs on the PICOe-9452 Super I/O Enhanced Hardware Monitor monitor the following temperatures:

- System temperature
- Power temperature
- CPU temperature

Eight voltage inputs on the PICOe-9452 Super I/O Enhanced Hardware Monitor monitor the following voltages:

- Vcore
- +2.5V
- +3.3V
- +5.0V
- +12.0V
- DDR Vtt
- +1.5V
- 5VSB

The PICOe-9452 Super I/O Enhanced Hardware Monitor also monitors the following voltages internally:

- VBAT

The PICOe-9452 Super I/O Enhanced Hardware Monitor also monitors the following fan speeds:

- CPU Fan speed

The values for the above environmental parameters are all recorded in the BIOS Hardware Health Configuration menu.

### 2.9.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the PICOe-9452 are listed below.

- Minimum Operating Temperature: 0ºC (32°F)
- Maximum Operating Temperature: 60°C (140°F)

A cooling fan and heat sink must be installed on the CPU. Thermal paste must be smeared on the lower side of the heat sink before it is mounted on the CPU. Heat sinks are also mounted on the northbridge and southbridge chipsets to ensure the operating temperature of these chips remain low.

### 2.9.3 Power Consumption

**Table 2-4** shows the power consumption parameters for the PICOe-9452 running with a 2.0GHz Intel® Core™2 Duo T2500 processor with a 667MHz FSB and 512MB of 667MHz DDR2 memory.

| Voltage | Current |
|---|---|
| 3.3V | 0.77A |
| 5.0V | 3.0A |
| 12.0V | 0.17A |

**Table 2-4: Power Consumption**

## 2.10 Expansion Options

### 2.10.1 Expansion Options Overview

A number of compatible IEI Technology Corp. PICOe backplanes and chassis can be used to develop and expanded system. These backplanes and chassis are listed below.

### 2.10.2 IEI Expansion PICOe Backplanes

The backplanes listed in **Table 2-5** are compatible with the PICOe-9452 and can be used to develop highly integrated industrial applications. All of the backplanes listed below have

24-pin ATX connector and a 4-pin ATX connector. For more information about these backplanes please consult the IEI catalog or contact your vendor, reseller or the IEI sales team at sales@iei.com.tw.

| Model | Total Slots | Expansion Slots | | |
|---|---|---|---|---|
| | | PCIe | | PCI |
| | | x4 | x1 | |
| HPE-3S1 | 3 | - | - | 2 |
| HPE-3S2 | 3 | 1 | - | 1 |
| HPE-4S1 | 4 | - | - | 3 |
| HPE-4S2 | 4 | 1 | - | 2 |
| HPE-5S1 | 5 | - | - | 4 |
| HPE-5S2 | 5 | 1 | - | 3 |
| HPE-5S3 | 5 | - | 2 | 2 |
| HPE-6S1 | 6 | 1 | - | 4 |
| HPE-6S2 | 6 | - | 2 | 3 |
| HPE-7S1 | 7 | - | 2 | 4 |
| HPE-8S | 7 | - | 2 | 4 |

**Table 2-5: Compatible IEI PICOe Backplanes**

### 2.10.3 IEI Chassis

IEI chassis available for PICOe-9452 system development are listed in **Table 2-6**.

For more information about these chassis please consult the IEI catalog or contact your vendor, reseller or the IEI sales team at sales@iei.com.tw.

| Model | Slot SBC | Mounting | Max Slots | Backplanes |
|---|---|---|---|---|
| PR-1300G | Half-size | Wall | 3 | HPE-3S1<br>HPE-3S2 |
| PAC-54G | Half-size | Wall | 3 | HPE-3S1<br>HPE-3S2 |
| PAC-42GH | Half-size | Wall | 4 | HPE-S1<br>HPE-4S2 |

| Model | Slot SBC | Mounting | Max Slots | Backplanes |
|---|---|---|---|---|
| PACO-504H | Half-size | Wall | 4 | HPE-S1<br>HPE-4S2 |
| PR-1500G | Half-size | Wall | 5 | HPE-5S1<br>HPE-5S2<br>HPE-5S3 |
| PAC-400G | Half-size | Wall | 5 | HPE-5S1<br>HPE-5S2<br>HPE-5S3 |
| PACK-500G | | | | HPE-5S1<br>HPE-5S2<br>HPE-5S3 |
| PACO-506H | Half-size | Wall | 6 | HPE-6S1<br>HPE-6S2 |
| PACO-700G | Half-size | Wall | 7 | HPE-7S1 |
| RACK-3400G | Half-size (4U) | Rack | 10 | HPE-8S |

Table 2-6: Compatible IEI Chassis

Chapter

3

# Unpacking

## 3.1 Anti-static Precautions

**WARNING:**

Failure to take ESD precautions during the installation of the PICOe-9452 may result in permanent damage to the PICOe-9452 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PICOe-9452. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PICOe-9452, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***:- Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the PICOe-9452, place it on an antic-static pad. This reduces the possibility of ESD damaging the PICOe-9452.
- ***Only handle the edges of the PCB***:- When handling the PCB, hold the PCB by the edges.

## 3.2 Unpacking

### 3.2.1 Unpacking Precautions

When the PICOe-9452 is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 3.1**.
- Make sure the packing box is facing upwards so the PICOe-9452 does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

## 3.3 Unpacking Checklist

**NOTE:**

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the PICOe-9452 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

### 3.3.1 Package Contents

The PICOe-9452 is shipped with the following components:

| Quantity | Item and Part Number | Image |
|---|---|---|
| 1 | PICOe-9452 | |
| 1 | IDE-cable<br>(**P/N**: 32200-008800) | |
| 1 | KB/MS PS/2 Y-cable<br>(**P/N**: 32000-023800-RS) | |
| 2 | SATA cables<br>(**P/N**: 32000-062800-RS) | |
| 1 | SATA power cable<br>(**P/N**: 32100-088600-RS) | |

| | | |
|---|---|---|
| 1 | Dual RS-232 cable<br><br>(**P/N**: 19800-000051-RS) | |
| 1 | Dual USB cable (w bracket)<br><br>(**P/N**:CB-USB02-RS) | |
| 1 | Mini jumper pack | |
| 1 | Quick installation guide | |
| 1 | Utility CD | |

**Table 3-1: Package List Contents**

### 3.3.2 Optional Items

**NOTE:**

The items listed in this section are optional items that must be ordered separately. Please contact your PICOe-9452 vendor, distributor or reseller for more information or, contact iEi directly by sending an email to sales@iei.com.tw.

The following optional items are available for the PICOe-9452.

| Quantity | Item and Part Number | Image |
|---|---|---|
| 1 | Audio kit_ 5.1 Channel<br>(**P/N**: AC-KIT08R-R10) | |
| 1 | Audio kit_ 7.1 Channel<br>(**P/N**: AC-KIT-883HD-R10) | |
| 1 | Cooling Kit<br>(**P/N**: CF-479B-RS) | |
| 1 | LPT cable (w/o bracket)<br>(**P/N**: 32200-015100-RS) | |
| 1 | S-Video cable<br>(**P/N**:320000-083100-RS) | |

**Table 3-2: Optional Items**

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Chapter

4

# Connector Pinouts

## 4.1 Peripheral Interface Connectors

Section 4.1.2 shows peripheral interface connector locations. Section 4.1.2 lists all the peripheral interface connectors seen in Section 4.1.2.

### 4.1.1 PICOe-9452 Layout

**Figure 4-1** shows the on-board peripheral connectors, rear panel peripheral connectors and on-board jumpers.

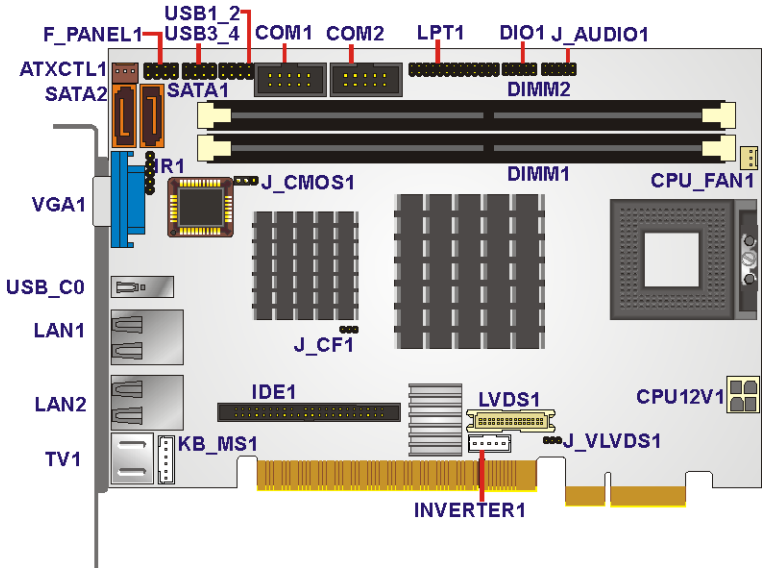



**Figure 4-1: Connector and Jumper Locations**

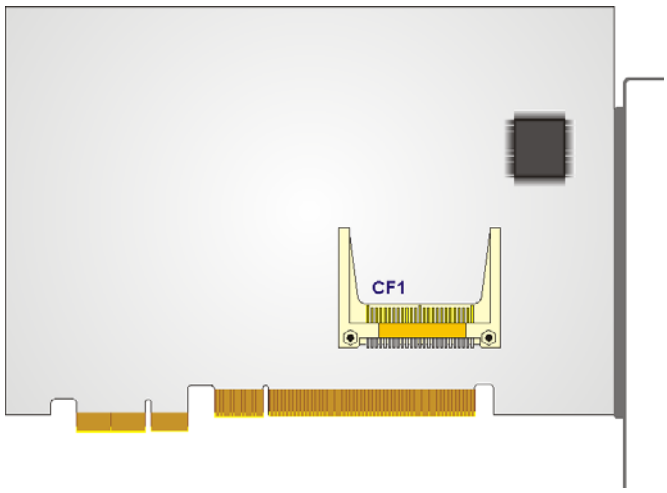



**Figure 4-2: Connector and Jumper Locations (Solder Side)**

### 4.1.2 Peripheral Interface Connectors

**Table 4-1** shows a list of the peripheral interface connectors on the PICOe-9452. Detailed descriptions of these connectors can be found below.

| Connector | Type | Label |
|---|---|---|
| +12V ATX power supply connector | 4-pin ATX connector | CPU12V1 |
| Audio connector | 9-pin header | J_AUDIO1 |
| Backplane power connector | 3-pin wafer | ATXCTL1 |
| Compact Flash (CF) connector | 50-pin header | CF1 |
| Digital I/O connector | 10-pin header | DIO1 |
| Fan connector | 3-pin wafer | CPU_FAN1 |
| Front panel connector | 8-pin header | F_PANEL1 |
| IDE Interface connector | 44-pin header | PIDE1 |
| Infrared connector | 5-pin header | IR1 |

| Connector | Type | Label |
|---|---|---|
| Inverter power connector | 5-pin header | INVERTER1 |
| Keyboard and mouse connector | 6-pin wafer | KB1 |
| LVDS connector | 30-pin crimp | LVDS1 |
| Parallel port connector | 26-pin header | LPT1 |
| Serial ATA (SATA) connector | 7-pin SATA connector | SATA1 |
| Serial ATA (SATA) connector | 7-pin SATA connector | SATA2 |
| Serial port connector (COM 1) | 10-pin header | COM1 |
| Serial port connector (COM2) | 10-pin header | COM2 |
| USB connector | 8-pin header | USB1_2 |
| USB connector | 8-pin header | USB3_4 |

**Table 4-1: Peripheral Interface Connectors**

### 4.1.3 External Interface Panel Connectors

Table 4-2 lists the rear panel connectors on the PICOe-9452. Detailed descriptions of these connectors can be found in **Section** 0 on **page 64**

| Connector | Type | Label |
|---|---|---|
| Ethernet connector | RJ-45 | LAN1 |
| Ethernet connector | RJ-45 | LAN2 |
| TV connector | Mini DIN | TV1 |
| USB port | USB port | USB_C0 |
| VGA port connector | Female DB-15 | VGA1 |

**Table 4-2: Rear Panel Connectors**

## 4.2 Internal Peripheral Connectors

Internal peripheral connectors are found on the motherboard and are only accessible when the motherboard is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the PICOe-9452.

### 4.2.1 +12V ATX Power Supply Connector

**CN Label:** CPU12V1

**CN Type:** 4-pin ATX power connector (1x4)

**CN Location:** See Figure 4-3

**CN Pinouts:** See Table 4-3

The 4-pin +12V ATX power supply connector is connected to a +12V ATX power supply.

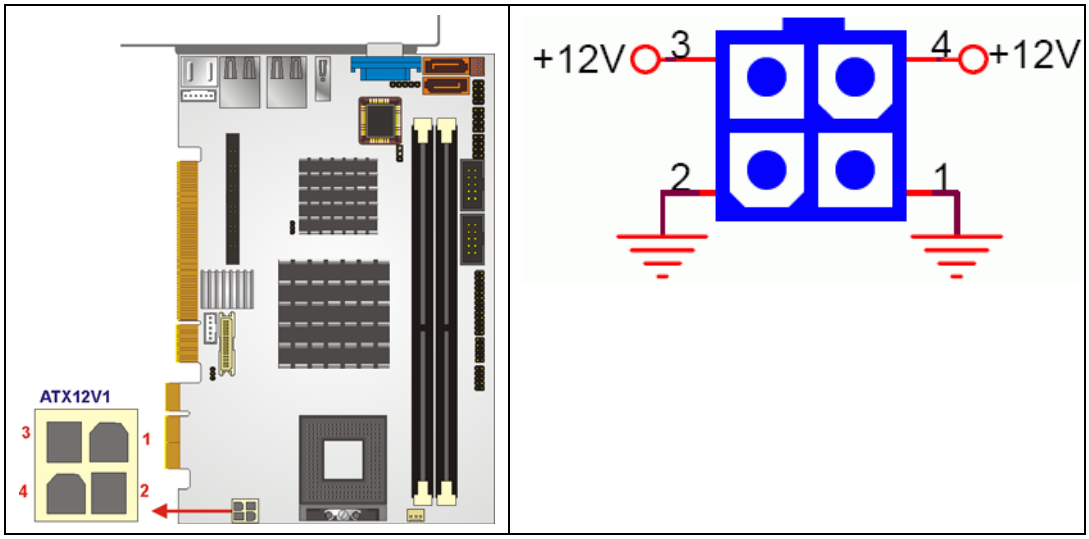



**Figure 4-3: +12V ATX Power Connector Location**

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | GND |
| 3 | +12V |

| | |
|---|---|
| 4 | +12V |

**Table 4-3: +12V ATX Power Connector Pinouts**

### 4.2.2 Audio Connector (9-pin)

**CN Label:** J_AUDIO1

**CN Type:** 9-pin header

**CN Location:** See Figure 4-4

**CN Pinouts:** See Table 4-4

An optional module can be connected to the 10-pin audio connector to provide the system with a high quality AC'97 or Azalia compatible codec that provides a complete integrated audio solution.

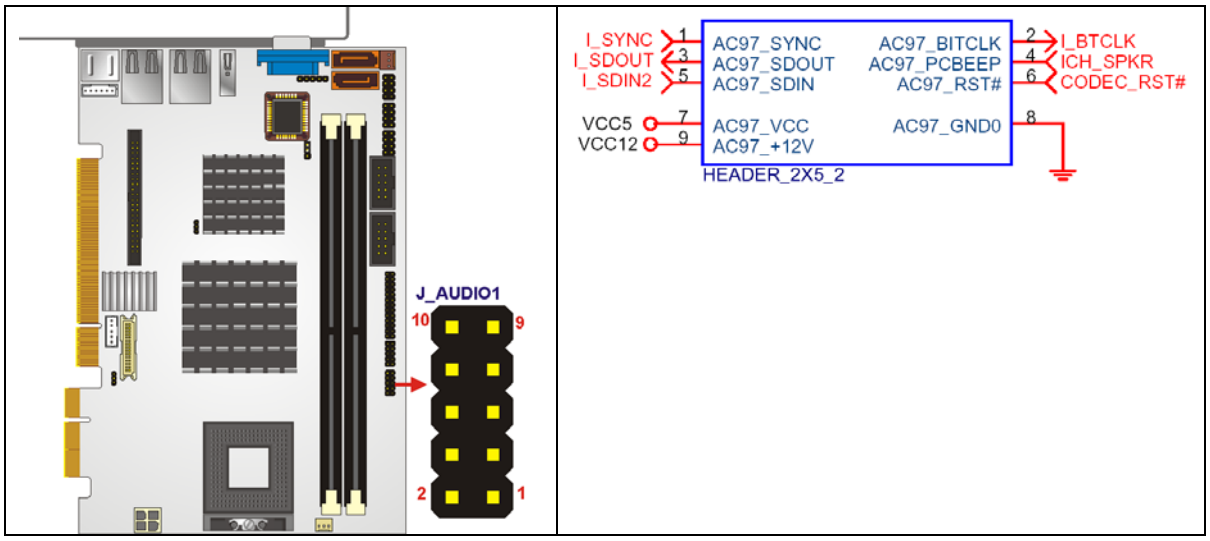



**Figure 4-4: Audio Connector Pinouts (10-pin)**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | AC97_SYNC | 2 | AC97_BITCLK |
| 3 | AC97_SDOUT | 4 | AC97_PCBEEP |
| 5 | AC97_SDIN | 6 | AC97_RST# |
| 7 | AC97_VCC | 8 | AC97_GND |

| | | | |
|---|---|---|---|
| 9 | AC97_12V | | |

**Table 4-4: Audio Connector Pinouts (10-pin)**

### 4.2.3 Backlight Inverter Connector

**CN Label:** **Inverter1**

**CN Type:** 5-pin wafer (1x5)

**CN Location:** See **Figure 4-5**

**CN Pinouts:** See **Table 4-5**

The backlight inverter connector provides the backlight on the LCD display connected to the PICOe-9452 with +12V of power.

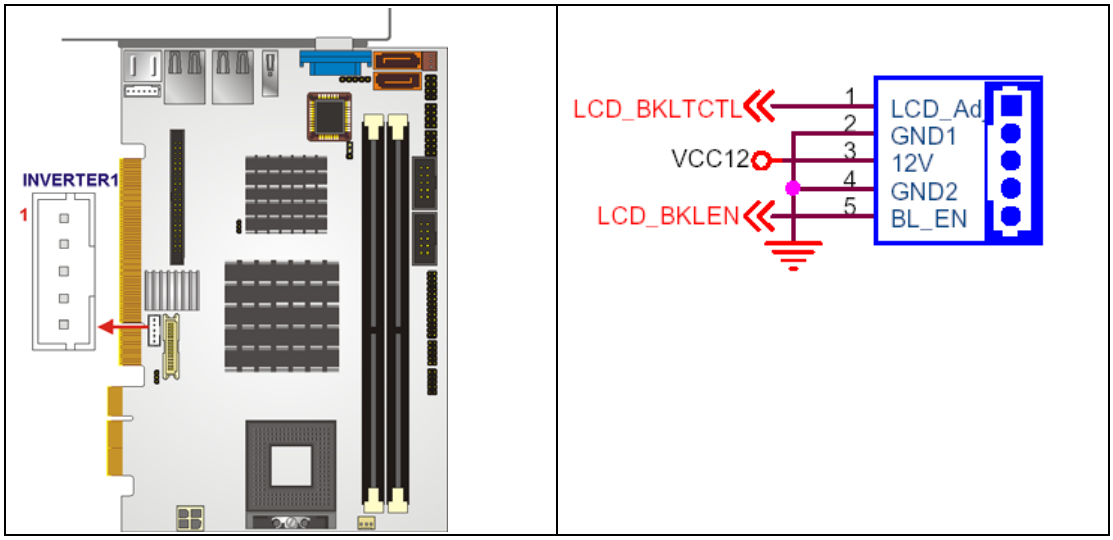



**Figure 4-5: Panel Backlight Connector Pinout Locations**

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | BRIGHTNESS |
| 2 | GROUND |
| 3 | +12V |
| 4 | GROUND |
| 5 | BACKLIGHT ENABLE |

**Table 4-5: Panel Backlight Connector Pinouts**

### 4.2.4 Backplane to Mainboard Connector

**CN Label:** **CN29**

**CN Type:** 3-pin wafer (1x3)

**CN Location:** See **Figure 4-6**

**CN Pinouts:** See **Table 4-6**

The backplane to mainboard connector closes the circuit between the mainboard and the backplane in which it is installed. The backplane should have an ATX connector and be powered by an ATX power supply.

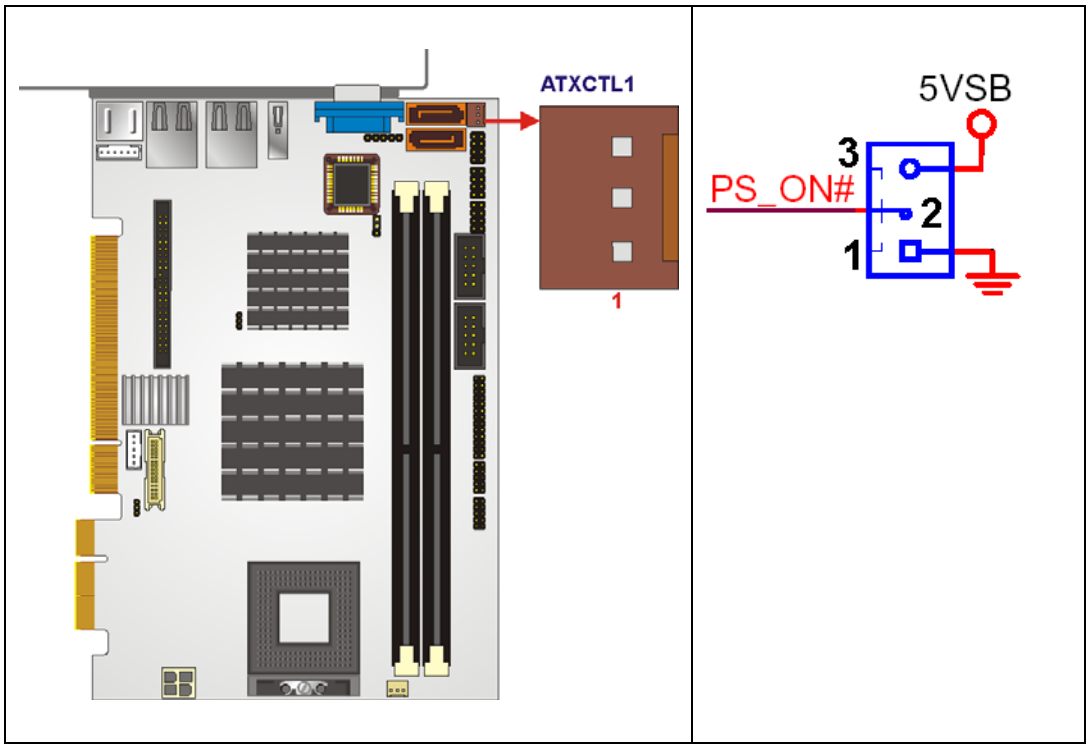



**Figure 4-6: Backplane to Mainboard Connector Location**

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | PS_ON# |
| 3 | 5VSB |

**Table 4-6: Backplane to Mainboard Connector Pinouts**

### 4.2.5 Compact Flash Socket

**CN Label:** CF1 (solder side)

**CN Type:** 50-pin header (2x25)

**CN Location:** See Figure 4-7

**CN Pinouts:** See Table 4-7

A CF Type I or Type II memory card is inserted to the CF socket on the solder side of the PICOe-9452.

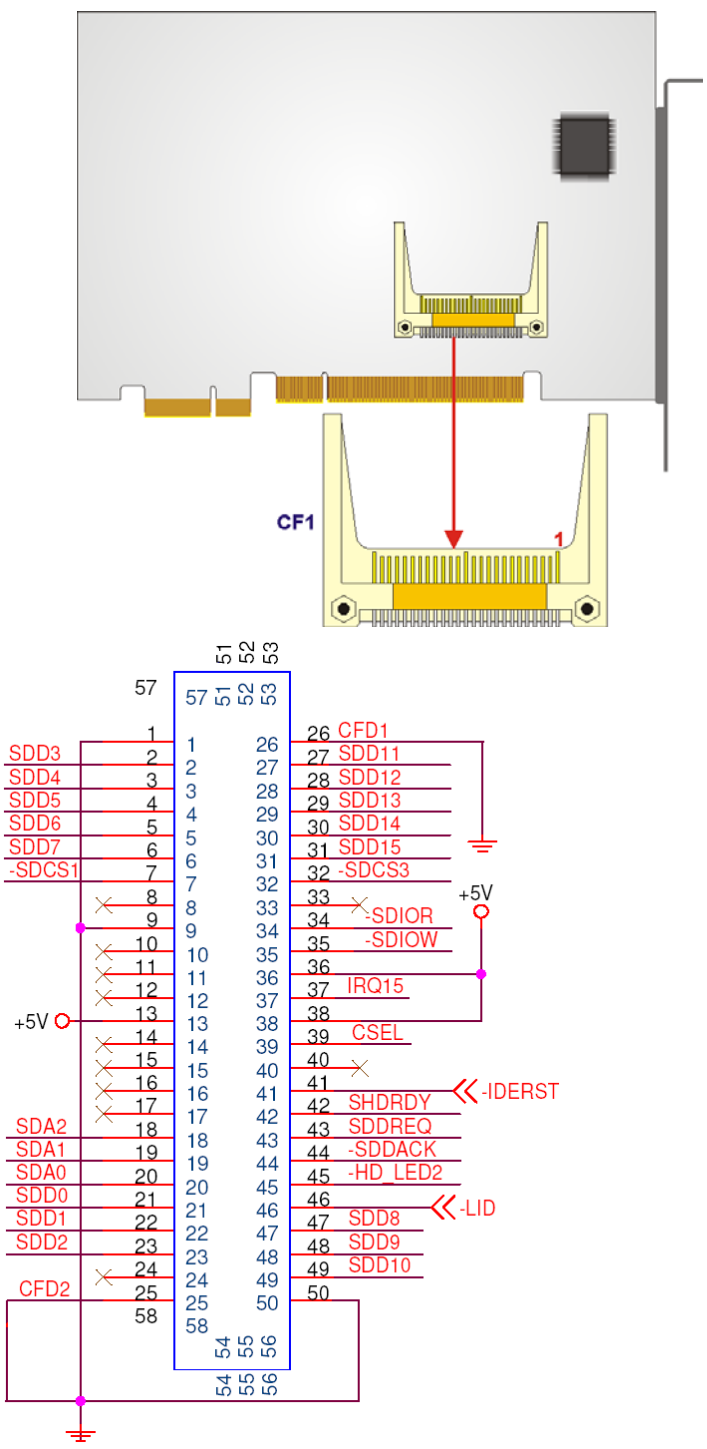



**Figure 4-7: CF Card Socket Location**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | GROUND | 26 | VCC-IN CHECK1 |
| 2 | DATA 3 | 27 | DATA 11 |
| 3 | DATA 4 | 28 | DATA 12 |
| 4 | DATA 5 | 29 | DATA 13 |
| 5 | DATA 6 | 30 | DATA 14 |
| 6 | DATA 7 | 31 | DATA 15 |
| 7 | HDC_CS0# | 32 | HDC_CS1 |
| 8 | N/C | 33 | N/C |
| 9 | GROUND | 34 | IOR# |
| 10 | N/C | 35 | IOW# |
| 11 | N/C | 36 | VCC_COM |
| 12 | N/C | 37 | IRQ15 |
| 13 | VCC_COM | 38 | VCC_COM |
| 14 | N/C | 39 | CSEL |
| 15 | N/C | 40 | N/C |
| 16 | N/C | 41 | HDD_RESET |
| 17 | N/C | 42 | IORDY |
| 18 | SA2 | 43 | SDREQ |
| 19 | SA1 | 44 | SDACK# |
| 20 | SA0 | 45 | HDD_ACTIVE# |
| 21 | DATA 0 | 46 | 66DET |
| 22 | DATA 1 | 47 | DATA 8 |
| 23 | DATA 2 | 48 | DATA 9 |
| 24 | N/C | 49 | DATA 10 |
| 25 | VCC-IN CHECK2 | 50 | GROUND |

Table 4-7: CF Card Socket Pinouts

### 4.2.6 Digital Input/Output (DIO) Connector

**CN Label:** DIO1

**CN Type:** 10-pin header (2x5)

**CN Location:** See Figure 4-8

**CN Pinouts:** See Table 4-8

The digital input/output connector is managed through a Super I/O chip. The DIO connector pins are user programmable.

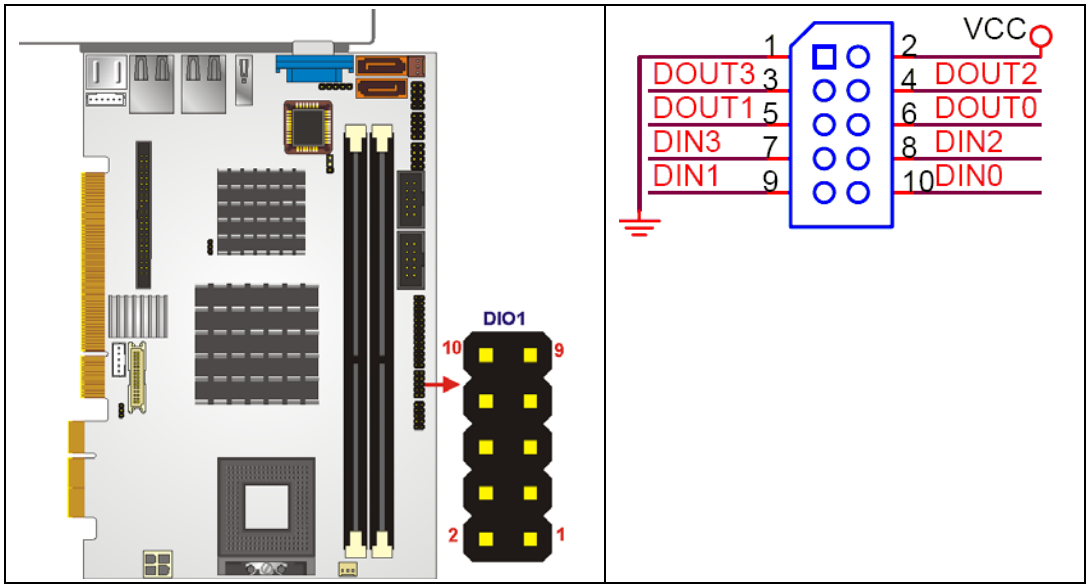



**Figure 4-8: DIO Connector Connector Locations**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | GND | 2 | VCC |
| 3 | Output 3 | 4 | Output 2 |
| 5 | Output 1 | 6 | Output 0 |
| 7 | Input 3 | 8 | Input 2 |
| 9 | Input 1 | 10 | Input 0 |

**Table 4-8: DIO Connector Connector Pinouts**

### 4.2.7 Fan Connector (+12V)

**CN Label:** **J4**

**CN Type:** 3-pin header

**CN Location:** See **Figure 4-9**

**CN Pinouts:** See **Table 4-9**

The cooling fan connector provides a 12V, 500mA current to a system cooling fan. The connector has a "rotation" pin to get rotation signals from fans and notify the system so the system BIOS can recognize the fan speed. Please note that only specified fans can issue the rotation signals.

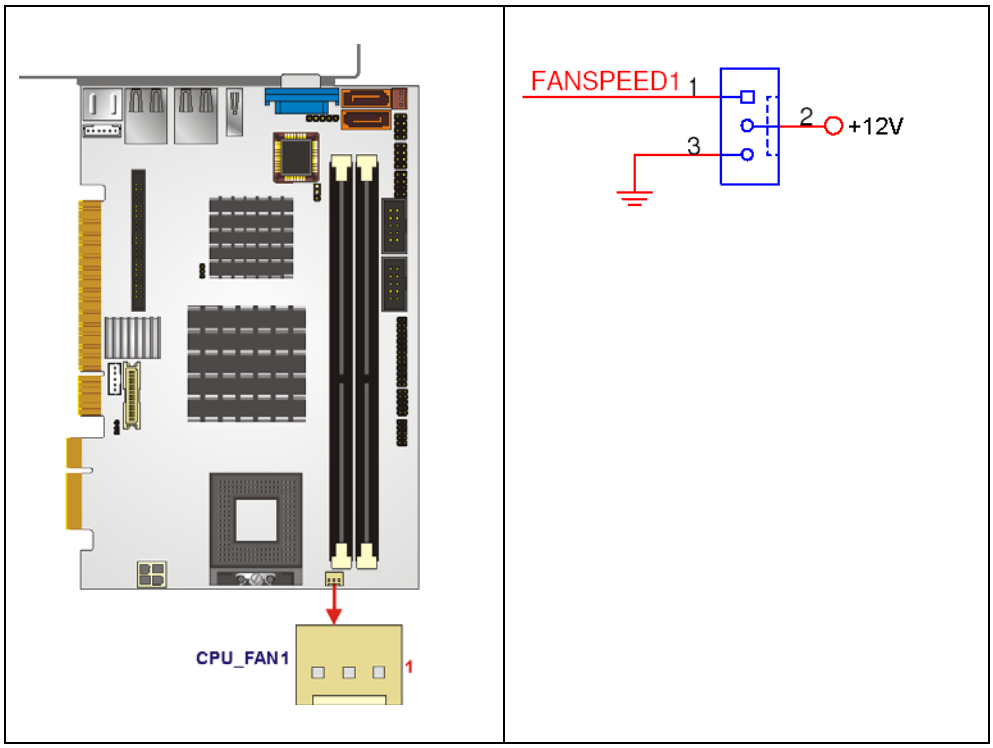



**Figure 4-9: +12V Fan Connector Location**

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | Fan Speed Detect |
| 2 | +12V |
| 3 | GND |

**Table 4-9: +12V Fan Connector Pinouts**

### 4.2.8 Front Panel Connector (8-pin)

**CN Label:** F_PANEL1

**CN Type:** 8-pin header (2x8)

**CN Location:** See Figure 4-10

**CN Pinouts:** See Table 4-10

The front panel connector connects to external switches and indicators to monitor and controls the motherboard. These indicators and switches include:

- Power button
- Reset button
- Power LED
- HDD LED

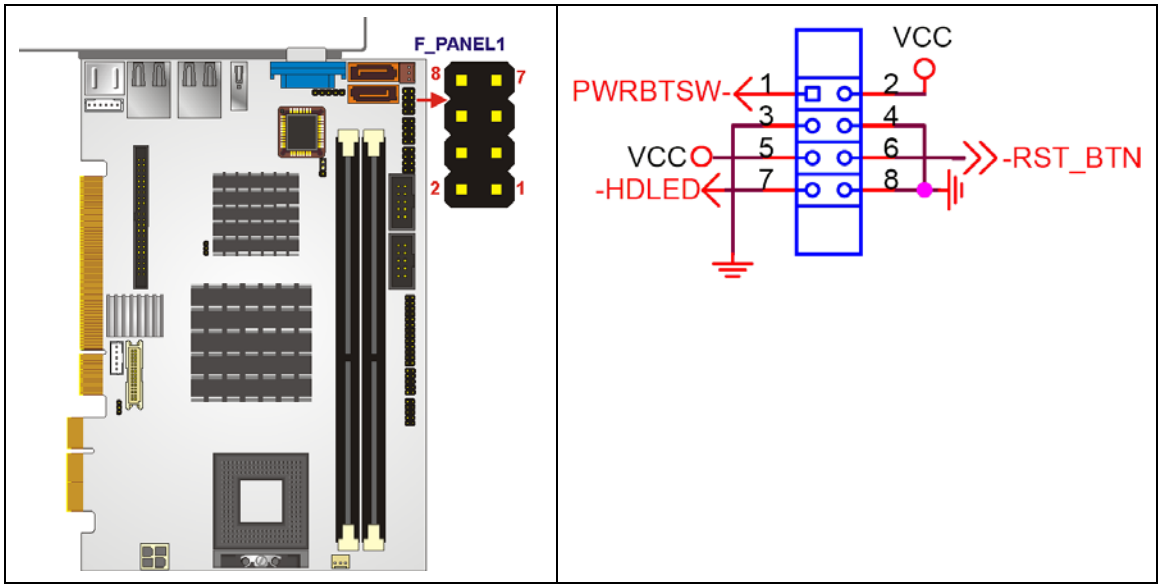



**Figure 4-10: Front Panel Connector Pinout Locations**

| FUNCTION | PIN | DESCRIPTION | FUNCTION | PIN | DESCRIPTION |
|---|---|---|---|---|---|
| Power Button | 1 | PWRBTSW- | Power LED | 2 | VCC |
| | 3 | GND | | 4 | Ground |
| HDD LED | 5 | VCC | Reset | 6 | SYSRST- |
| | 7 | HDD LED- | | 8 | GND |

**Table 4-10: Front Panel Connector Pinouts**

### 4.2.9 IDE Connector (44-pin)

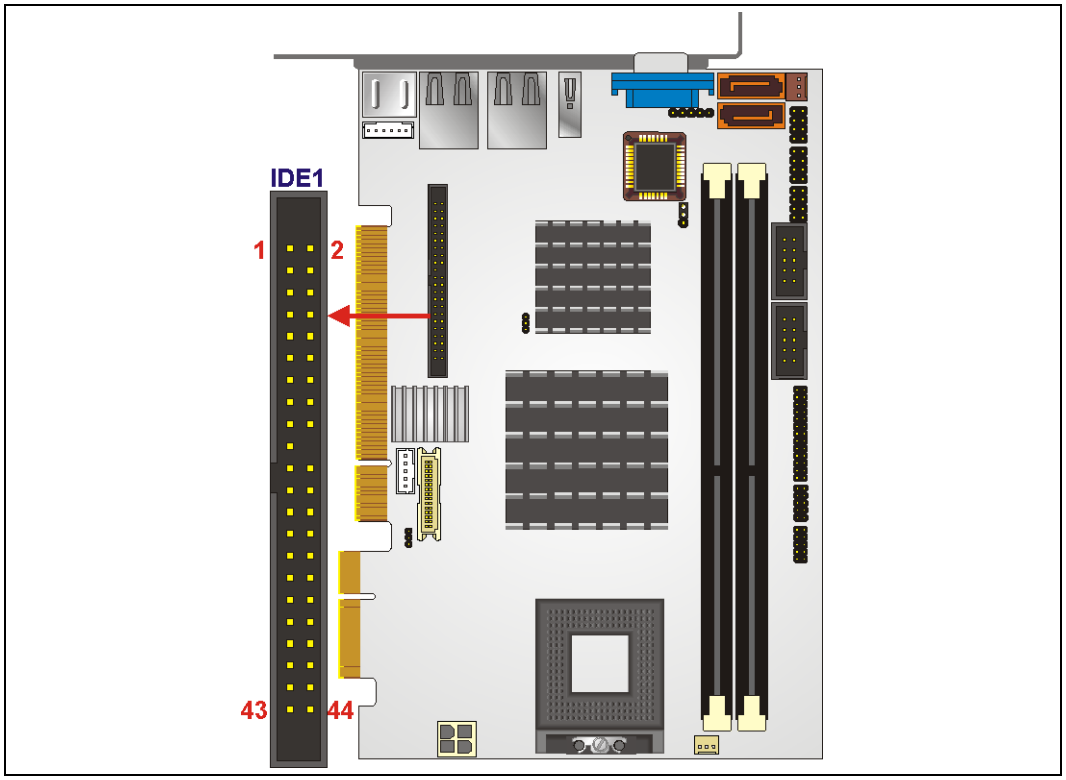
**CN Label:** IDE1

**CN Type:** 44-pin header (2x22)

**CN Location:** See Figure 4-11

**CN Pinouts:** See Table 4-11

One 44-pin IDE device connector on the PICOe-9452 supports connectivity to two hard disk drives.



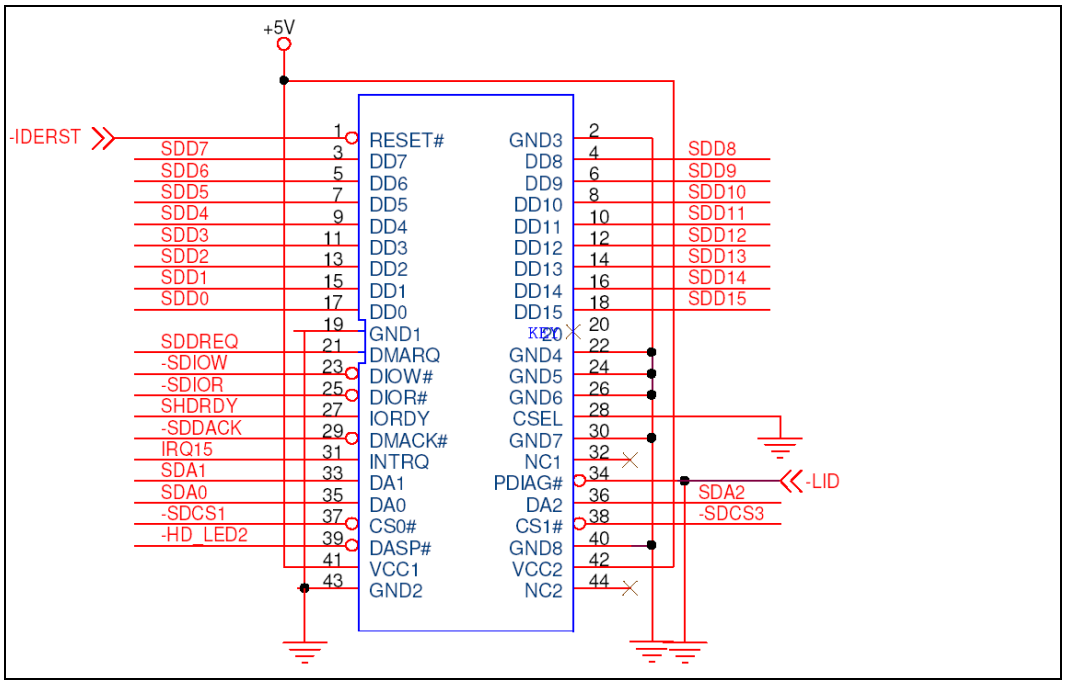



**Figure 4-11: IDE Device Connector Locations**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | RESET# | 2 | GROUND |
| 3 | DATA 7 | 4 | DATA 8 |
| 5 | DATA 6 | 6 | DATA 9 |
| 7 | DATA 5 | 8 | DATA 10 |
| 9 | DATA 4 | 10 | DATA 11 |
| 11 | DATA 3 | 12 | DATA 12 |
| 13 | DATA 2 | 14 | DATA 13 |
| 15 | DATA 1 | 16 | DATA 14 |
| 17 | DATA 0 | 18 | DATA 15 |
| 19 | GROUND | 20 | N/C |
| 21 | IDE DRQ | 22 | GROUND |
| 23 | IOW# | 24 | GROUND |
| 25 | IOR# | 26 | GROUND |
| 27 | IDE CHRDY | 28 | GROUND |
| 29 | IDE DACK | 30 | GROUND–DEFAULT |
| 31 | INTERRUPT | 32 | N/C |

| | | | |
|---|---|---|---|
| 33 | SA1 | 34 | N/C |
| 35 | SA0 | 36 | SA2 |
| 37 | HDC CS0# | 38 | HDC CS1# |
| 39 | HDD ACTIVE# | 40 | GROUND |
| 41 | VCC | 42 | VCC |
| 43 | GROUND | 44 | N/C |

**Table 4-11: IDE Connector Pinouts**

### 4.2.10 Infrared Interface Connector (5-pin)

**CN Label:** **CN19**

**CN Type:** 5-pin header (1x5)

**CN Location:** See **Figure 4-12**

**CN Pinouts:** See **Table 4-12**

The infrared interface connector supports both Serial Infrared (SIR) and Amplitude Shift Key Infrared (ASKIR) interfaces.

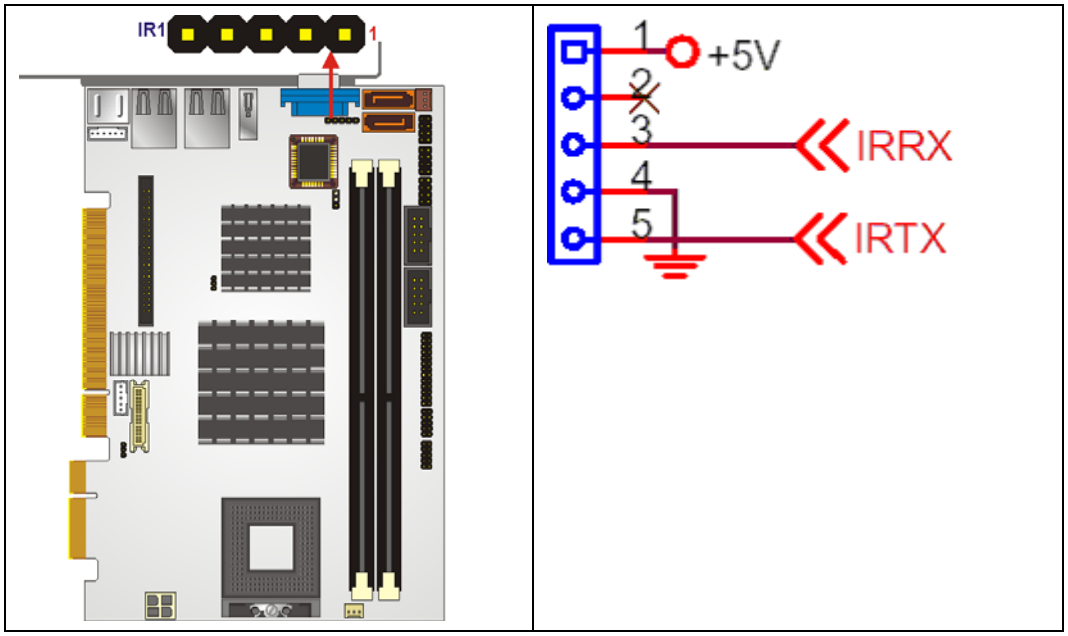



**Figure 4-12: Infrared Connector Pinout Locations**

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | VCC |
| 2 | NC |
| 3 | IR-RX |
| 4 | GND |
| 5 | IR-TX |

**Table 4-12: Infrared Connector Pinouts**

### 4.2.11 Keyboard/Mouse Connector

**CN Label:** **CN22**

**CN Type:** 6-pin header (1x6)

**CN Location:** See **Figure 4-13**

**CN Pinouts:** See **Table 4-13**

The keyboard and mouse connector can be connected to a standard PS/2 cable or PS/2 Y-cable to add keyboard and mouse functionality to the system.

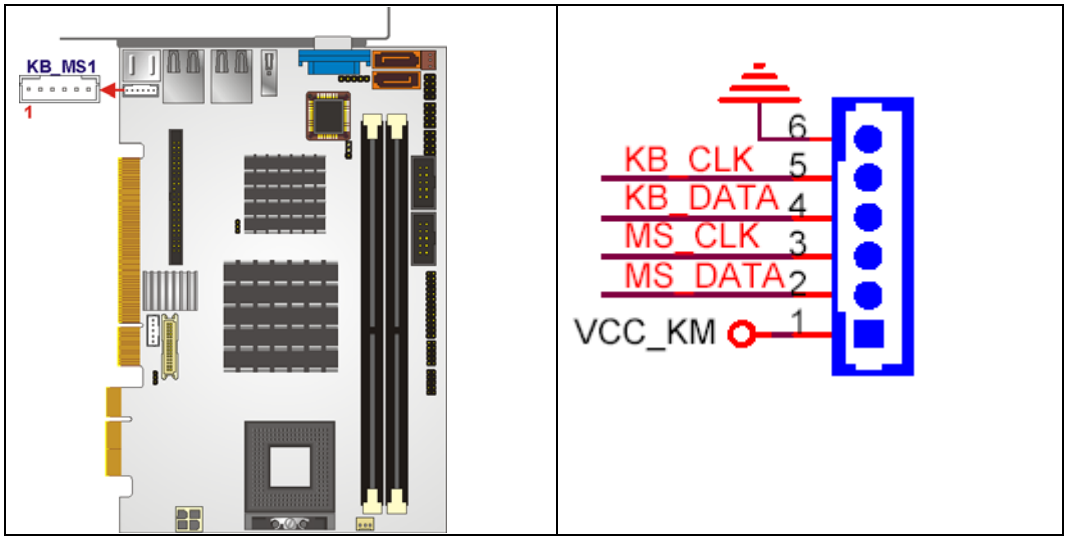



**Figure 4-13: Keyboard/Mouse Connector Location**

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | +5V KB DATA |
| 2 | MS DATA |
| 3 | MS CLK |
| 4 | KB DATA |
| 5 | KB CLK |
| 6 | GROUND |

**Table 4-13: Keyboard/Mouse Connector Pinouts**

### 4.2.12 LVDS LCD Connector

**CN Label:** LVDS1

**CN Type:** 30-pin crimp (2x10)

**CN Location:** See Figure 4-14

**CN Pinouts:** See Table 4-14

The 30-pin LVDS LCD connector can be connected to single channel or dual channel, 18-bit LVDS panel.

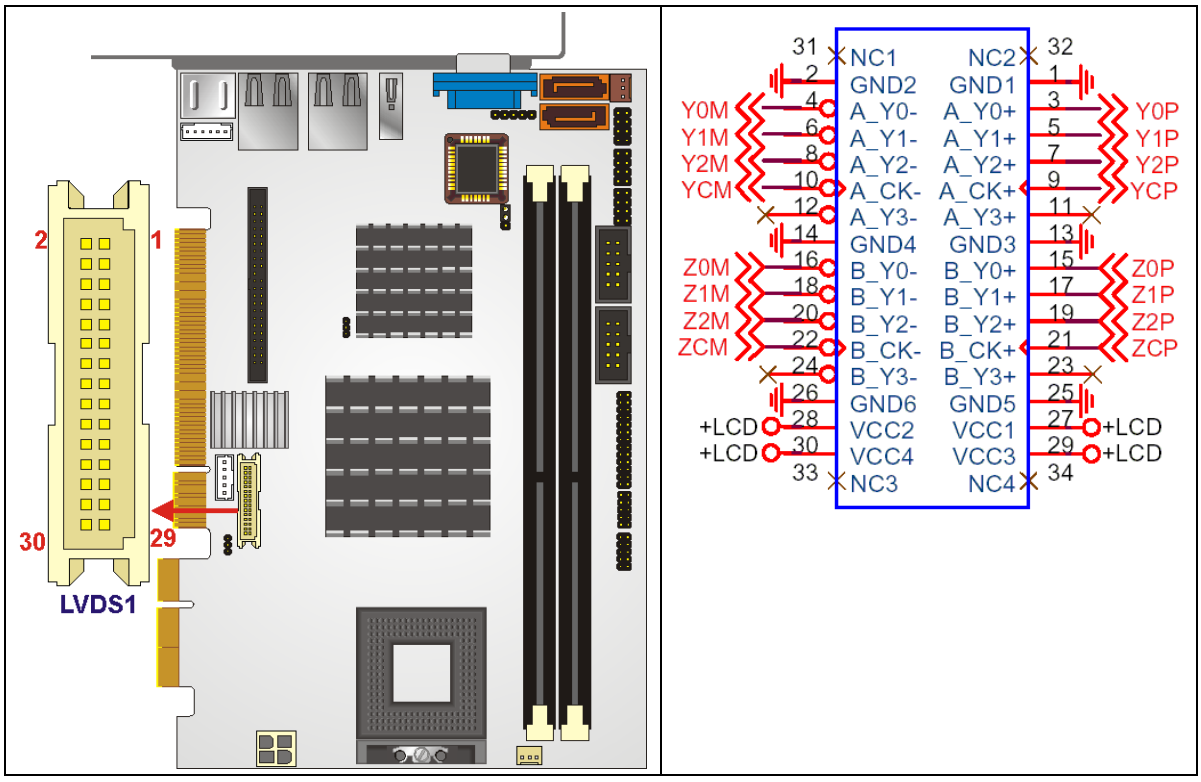



**Figure 4-14: LVDS LCD Connector Pinout Locations**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | GROUND | 2 | GROUND |
| 3 | LVDSA_Y0+ | 4 | LVDSA_Y0- |
| 5 | LVDSA_Y1+ | 6 | LVDSA_Y1- |
| 7 | LVDSA_Y2+ | 8 | LVDSA_Y2- |
| 9 | LVDSA_CLK+ | 10 | LVDSA_CLK- |
| 11 | N/C | 12 | N/C |
| 13 | GROUND | 14 | GROUND |
| 15 | LVDSB_Y0+ | 16 | LVDSB_Y0- |
| 17 | LVDSB_Y1+ | 18 | LVDSB_Y1- |
| 19 | LVDSB_Y2+ | 20 | LVDSB_Y2- |
| 21 | LVDSB_CLK+ | 22 | LVDSB_CLK- |
| 23 | N/C | 12 | N/C |
| 25 | GROUND | 26 | GROUND |
| 27 | VCC_LVDS | 28 | VCC_LVDS |

| | | | |
|---|---|---|---|
| 29 | VCC_LVDS | 30 | VCC_LVDS |

**Table 4-14: LVDS LCD Port Connector Pinouts**

### 4.2.13 Parallel Port Connector

**CN Label:** LPT1

**CN Type:** 26-pin box header

**CN Location:** See Figure 4-15

**CN Pinouts:** See Table 4-15

The 26-pin parallel port connector connects to a parallel port connector interface or some other parallel port device such as a printer.

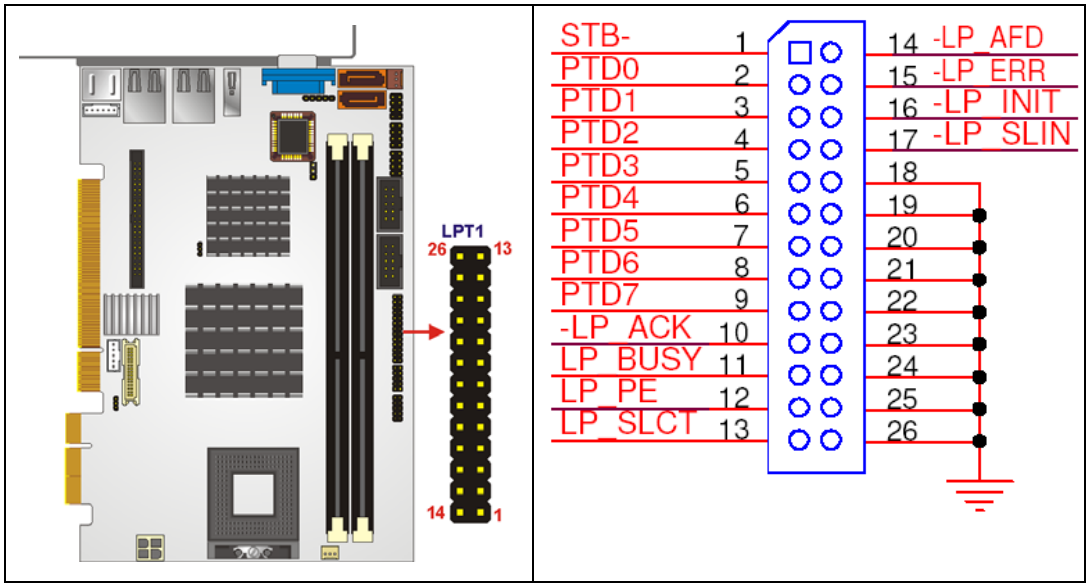



**Figure 4-15: Parallel Port Connector Location**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | STROBE# | 2 | DATA 0 |
| 3 | DATA 1 | 4 | DATA 2 |
| 5 | DATA 3 | 6 | DATA 4 |
| 7 | DATA 5 | 8 | DATA 6 |

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 9 | DATA 7 | 10 | ACKNOWLEDGE |
| 11 | BUSY | 12 | PAPER EMPTY |
| 13 | PRINTER SELECT | 14 | AUTO FORM FEED # |
| 15 | ERROR# | 16 | INITIALIZE |
| 17 | PRINTER SELECT LN# | 18 | GROUND |
| 19 | GROUND | 20 | GROUND |
| 21 | GROUND | 22 | GROUND |
| 23 | GROUND | 24 | GROUND |
| 25 | GROUND | 26 | NC |

**Table 4-15: Parallel Port Connector Pinouts**

### 4.2.14 SATA Drive Connectors

**CN Label:** SATA1 and SATA2

**CN Type:** 7-pin SATA drive connectors

**CN Location:** See Figure 4-16

**CN Pinouts:** See Table 4-16

The two SATA drive connectors are each connected to a first generation SATA drive. First generation SATA drives transfer data at speeds as high as 150Mb/s. The SATA drives can be configured in a RAID configuration.

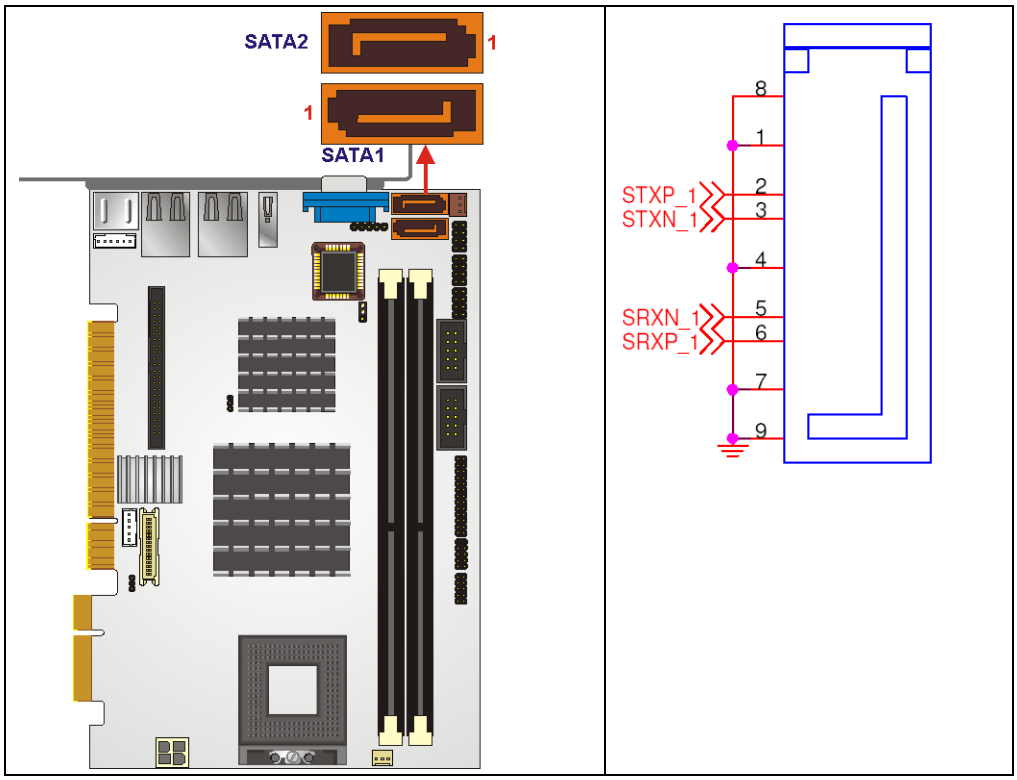



**Figure 4-16: SATA Drive Connector Locations**

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | TX+ |
| 3 | TX- |
| 4 | GND |
| 5 | RX- |
| 6 | RX+ |
| 7 | GND |

**Table 4-16: SATA Drive Connector Pinouts**

### 4.2.15 Serial Port Connector (COM1 and COM2)

**CN Label:** COM1 and COM2

**CN Type:** 10-pin header (2x5)

**CN Location:** See Figure 4-17

**CN Pinouts:** See Table 4-17

The 10-pin serial port connector provides a second RS-232 serial communications channel. The COM 2 serial port connector can be connected to external RS-232 serial port devices.

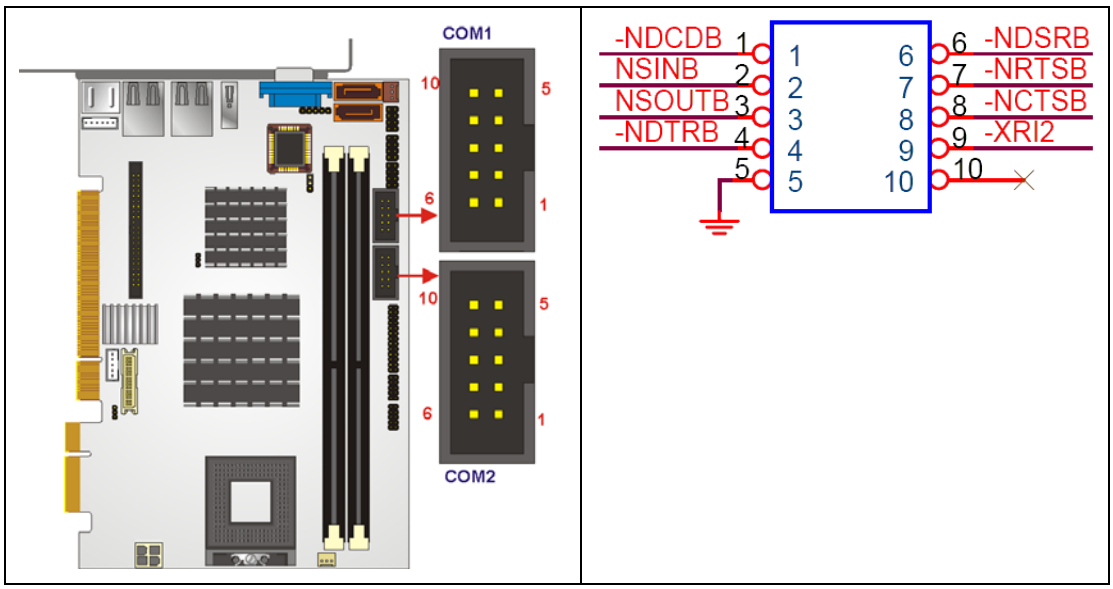



**Figure 4-17: COM1 and COM2 Connector Pinout Locations**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | Data Carrier Detect (DCD) | 6 | Data Set to Ready (DSR) |
| 2 | Receive Data (RXD) | 7 | Request to Send (RTS) |
| 3 | Transmit Data (TXD) | 8 | Clear to Sent (CTS) |
| 4 | Data Terminal Ready (DTR) | 9 | Ring Indicator (RI) |
| 5 | Ground (GND) | 10 | N/C |

**Table 4-17: COM3 and COM4**

### 4.2.16 USB Connectors (Internal)

**CN Label:** USB1_2 and USB3_4

**CN Type:** 8-pin header (2x4)

**CN Location:** See Figure 4-18

**CN Pinouts:** See Table 4-18

The 2x4 USB pin connectors each provide connectivity to two USB 1.1 or two USB 2.0 ports. Each USB connector can support two USB devices.. Additional external USB ports are found on the rear panel. The USB ports are used for I/O bus expansion.

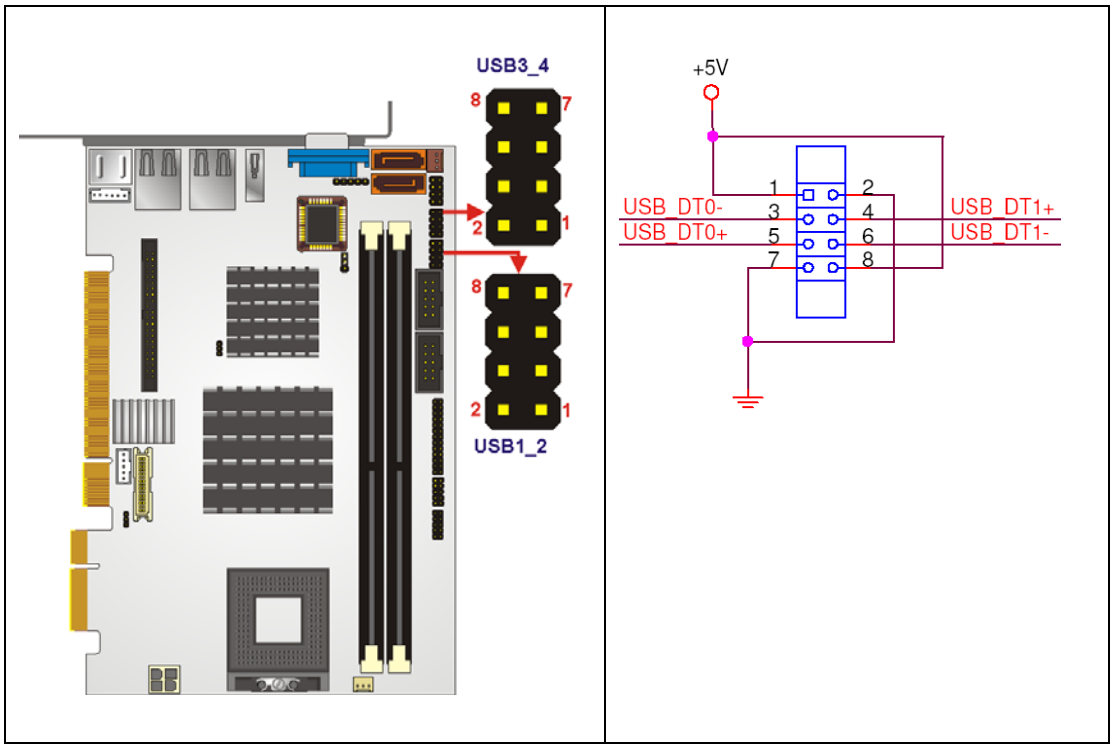



**Figure 4-18: USB Connector Pinout Locations**

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | VCC | 2 | GND |
| 3 | DATAN- | 4 | DATA1M+ |
| 5 | DATAN+ | 6 | DATAM- |
| 7 | GND | 8 | VCC |

**Table 4-18: USB Port Connector Pinouts**

## 4.3 External Peripheral Interface Connector Panel

**Figure 4-19** shows the PICOe-9452 rear panel. The PICOe-9452 rear panel consists of two RJ-45 Ethernet connectors, a PS/2 keyboard connector a USB port and a VGA connector. These connectors are accessible when the PICOe-9452 is installed in a chassis.

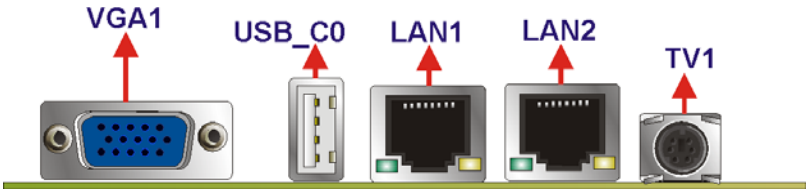



**Figure 4-19: PICOe-9452 External Peripheral Interface Connector**

### 4.3.1 LAN Connectors

**CN Label:** LAN1 and LAN2

**CN Type:** RJ-45

**CN Location:** See **Figure 4-19**

**CN Pinouts:** See **Table 4-19**

The PICOe-9452 is equipped with two built-in RJ-45 Ethernet controllers. The controllers can connect to the LAN through two RJ-45 LAN connectors. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | TXA+ | 5 | TXC- |
| 2 | TXA- | 6 | TXB- |
| 3 | TXB+ | 7 | TXD+ |
| 4 | TXC+ | 8 | TXD- |

**Table 4-19: LAN Pinouts**

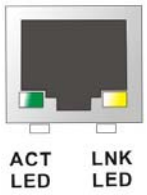



**Figure 4-20: RJ-45 Ethernet Connector**

The RJ-45 Ethernet connector has two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the port is linked. See **Table 4-20**.

| STATUS | DESCRIPTION | STATUS | DESCRIPTION |
|---|---|---|---|
| GREEN | Activity | YELLOW | Linked |

**Table 4-20: RJ-45 Ethernet Connector LEDs**

### 4.3.2 TV Connector

**CN Label:** TV1

**CN Type:** 7-pin Mini-DIN

**CN Location:** See Figure 4-19

**CN Pinouts:** See Table 4-21

A 7-pin mini DIN connector (TV1) is located on the mounting bracket for easy connection to a TV OUT cable.

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | GND |
| 2 | BLUE_CVBS |
| 3 | GND |
| 4 | GREEN_Y |
| 5 | NC |
| 6 | RED_C |
| 7 | GND |

**Table 4-21: TV1 Pinouts**

### 4.3.3 USB Connector

**CN Label:** USB_C0

**CN Type:** USB port

**CN Location:** See Figure 4-19

**CN Pinouts:** See Table 4-22

The PICOe-9452 has a one external USB 2.0 port. The port connects to both USB 2.0 and USB 1.1 devices.

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | USBV3L 5V | 2 | GND |
| 3 | USBP4N | 4 | USBP5P |
| 5 | USBP4P | 6 | USBP5N |
| 7 | GND | 8 | USBV3L 5V |

**Table 4-22: USB Port Pinouts**

### 4.3.4 VGA Connector

**CN Label:** VGA1

**CN Type:** 15-pin Female

**CN Location:** See Figure 4-19

**CN Pinouts:** See Figure 4-21 and Table 4-23

The PICOe-9452 has a single 15-pin female connector for connectivity to standard display devices.

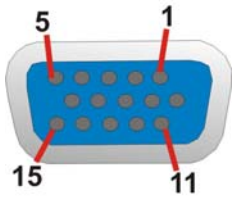



**Figure 4-21: VGA Connector**

| PIN | DESCRIPTION | PIN | DESCRIPTION |
|---|---|---|---|
| 1 | RED | 2 | GREEN |
| 3 | BLUE | 4 | NC |
| 5 | GND | 6 | GND |
| 7 | GND | 8 | GND |
| 9 | VCC / NC | 10 | GND |
| 11 | NC | 12 | DDC DAT |
| 13 | HSYNC | 14 | VSYNC |
| 15 | DDCCLK | | |

**Table 4-23: VGA Connector Pinouts**

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Chapter

5

# Installation

## 5.1 Anti-static Precautions

**WARNING:**

Failure to take ESD precautions during the installation of the PICOe-9452 may result in permanent damage to the PICOe-9452 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PICOe-9452. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PICOe-9452, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***:- Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the PICOe-9452, place it on an antic-static pad. This reduces the possibility of ESD damaging the PICOe-9452.
- ***Only handle the edges of the PCB***:-: When handling the PCB, hold the PCB by the edges.

## 5.2 Installation Considerations

**NOTE:**

The following installation notices and installation considerations should be read and understood before the PICOe-9452 is installed. All installation notices pertaining to the installation of the PICOe-9452 should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the PICOe-9452 and injury to the person installing the motherboard.

### 5.2.1 Installation Notices

**WARNING:**

The installation instructions described in this manual should be carefully followed in order to prevent damage to the PICOe-9452, PICOe-9452 components and injury to the user.

Before and during the installation please **DO** the following:

- **Read the user manual**:
  - The user manual provides a complete description of the PICOe-9452 installation instructions and configuration options.
- **Wear an electrostatic discharge cuff (ESD)**:
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- **Place the PICOe-9452 on an antistatic pad**:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- **Turn all power to the PICOe-9452 off**:

- When working with the PICOe-9452, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the PICOe-9452 **DO NOT:**

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

### 5.2.2 Installation Checklist

The following checklist is provided to ensure the PICOe-9452 is properly installed.

- All the items in the packing list are present
- The CPU is installed
- The CPU cooling kit is properly installed
- A compatible memory module is properly inserted into the slot
- The CF Type I or CF Type II card is properly installed into the CF socket
- The jumpers have been properly configured
- The PICOe-9452 is inserted into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
  - IDE device
  - SATA drives
  - Keyboard and mouse cable
  - Audio kit
  - Power supply
  - USB cable
  - Serial port cable
  - Parallel port cable
- The following external peripheral devices are properly connected to the chassis:
  - VGA screen

- Keyboard
- Mouse
- RS-232 serial communications device

## 5.3 CPU, CPU Cooling Kit and DIMM Installation

**WARNING:**

A CPU should never be turned on without the specified cooling kit being installed. If the cooling kit (heat sink and fan) is not properly installed and the system turned on, permanent damage to the CPU, PICOe-9452 and other electronic components attached to the system may be incurred. Running a CPU without a cooling kit may also result in injury to the user.

The CPU, CPU cooling kit and DIMM are the most critical components of the PICOe-9452. If one of these component is not installed the PICOe-9452 cannot run.

### 5.3.1 Socket 479 CPU Installation

**WARNING:**

CPUs are expensive and sensitive components. When installing the CPU please be careful not to damage it in anyway. Make sure the CPU is installed properly and ensure the correct cooling kit is properly installed.

To install a socket 479 CPU onto the PICOe-9452, follow the steps below:

**WARNING:**

When handling the CPU, only hold it on the sides. DO NOT touch the pins at the bottom of the CPU.

**Step 1:** **Unlock the CPU retention screw.** When shipped, the retention screw of the CPU socket should be in the unlocked position. If it is not in the unlocked position, use a screwdriver to unlock the screw. See **Figure 5-1**.

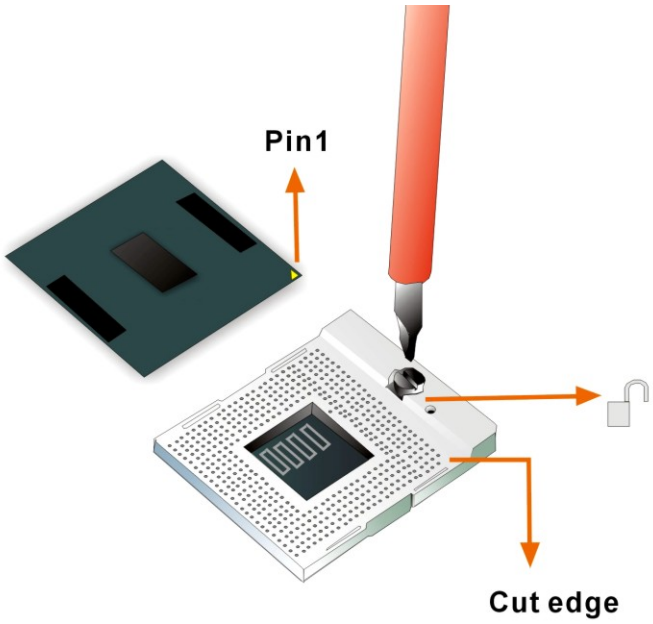


**Figure 5-1: Make sure the CPU socket retention screw is unlocked**

**Step 2:** **Inspect the CPU socket.** Make sure there are no bent pins and make sure the socket contacts are free of foreign material. If any debris is found, remove it with compressed air.

**Step 3:** **Correctly Orientate the CPU**. Make sure the IHS (integrated heat sink) side is facing upwards.

**Step 4:** **Correctly position the CPU.** Match the Pin 1 mark with the cut edge on the CPU socket. See **Figure 5-1**.

**Step 5:** **Align the CPU pins.** Carefully align the CPU pins with the holes in the CPU socket.

**Step 6:** **Insert the CPU.** Gently insert the CPU into the socket. If the CPU pins are properly aligned, the CPU should slide into the CPU socket smoothly.

**Step 7:** **Lock the retention screw.** Rotate the retention screw into the locked position. See **Figure 5-2**.

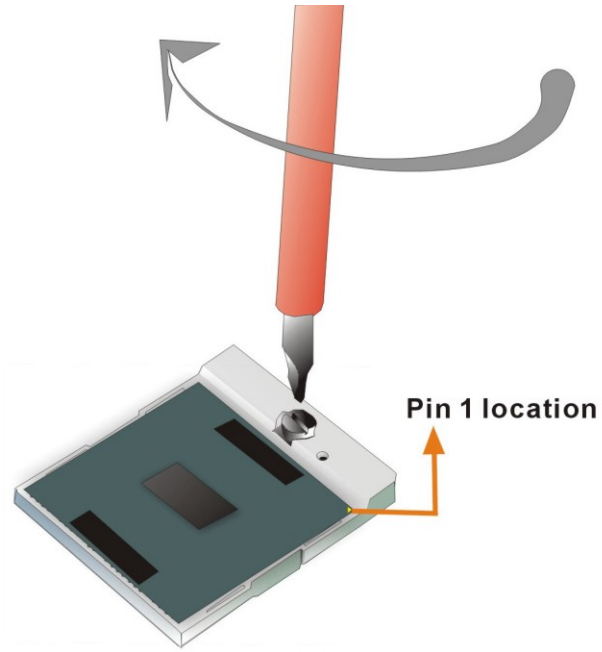


**Figure 5-2: Lock the CPU Socket Retention Screw**

### 5.3.2 Cooling Kit CF-479B-RS Installation

**Figure 5-3: IEI CF-479B-RS Cooling Kit**

An IEI Socket 479 CPU cooling kit can be purchased separately. The cooling kit comprises a CPU heat sink and a cooling fan.

**WARNING:**

Do not wipe off (accidentally or otherwise) the pre-sprayed layer of thermal paste on the bottom of the [Fan model#] heat sink. The thermal paste between the CPU and the heat sink is important for optimum heat dissipation.

To install the CF-479B-RS cooling kit, please follow the steps below.

**Step 1:** **Place the cooling kit onto the CPU**. Make sure the CPU cooling fan cable can be properly routed when the cooling kit is installed.

**Step 2:** **Properly align the cooling kit**. Make sure its four spring screw fasteners can pass through the pre-drilled holes on the PCB.

**Step 3:** **Secure the cooling kit**. From the solder side of the PCB, align the support bracket to the screw threads on heat sink that were inserted through the PCB holes. (See **Figure 5-4**)

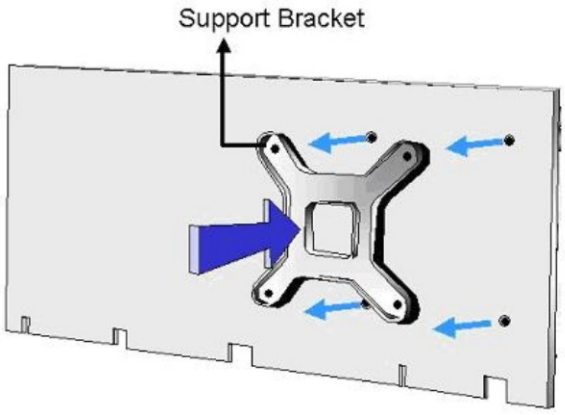


**Figure 5-4: Cooling Kit Support Bracket**

**Step 4:** **Tighten the screws**. Use a screwdriver to tighten the four screws. Tighten each nut a few turns at a time and do not over-tighten the screws.

**Step 5:** **Connect the fan cable**. Connect the cooling kit fan cable to the fan connector on the motherboard. Carefully route the cable and avoid heat generating chips and fan blades. See **Figure 5-5**.

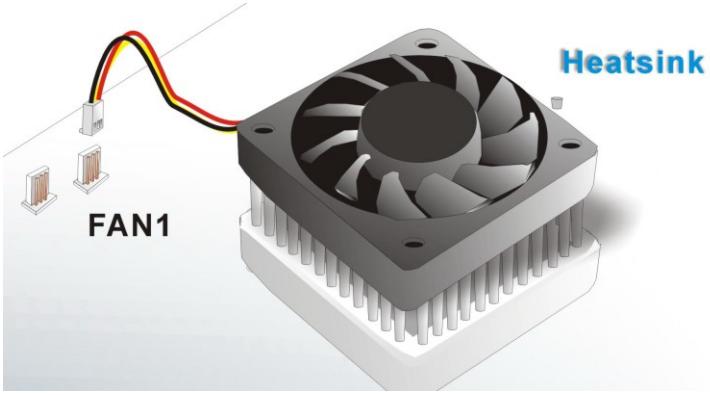


**Figure 5-5: Connect the cooling fan cable**

### 5.3.3 DIMM Installation

**WARNING:**

Using incorrectly specified DIMM may cause permanently damage the PCIE-9452. Please make sure the purchased DIMM complies with the memory specifications of the PCIE-9452. DIMM specifications compliant with the PCIE-9452 are listed in **Chapter 2**.

To install a DIMM into a DIMM socket, please follow the steps below and refer to **Figure 5-6**.

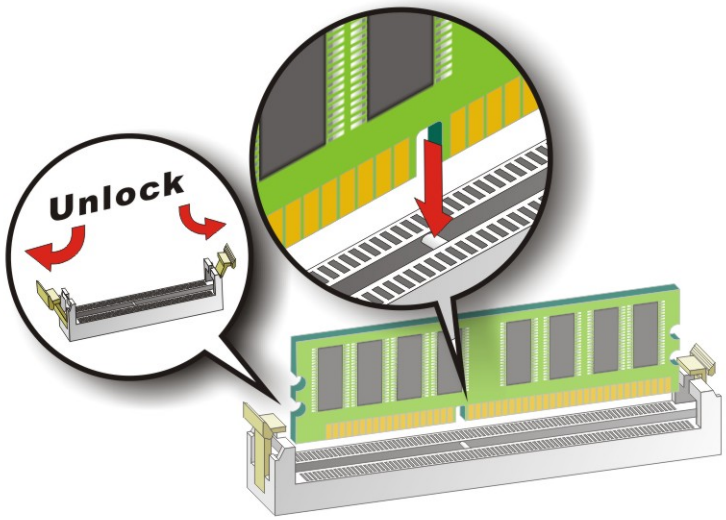


**Figure 5-6: Installing a DIMM**

**Step 1:** **Open the DIMM socket handles**. The DIMM socket has two handles that secure the DIMM into the socket. Before the DIMM can be inserted into the socket, the handles must be opened. See **Figure 5-6**.

**Step 2:** **Align the DIMM with the socket**. The DIMM must be oriented in such a way that the notch in the middle of the DIMM must be aligned with the plastic bridge

in the socket. See **Figure 5-6**.

**Step 3:** **Insert the DIMM**. Once properly aligned, the DIMM can be inserted into the socket. As the DIMM is inserted, the white handles on the side of the socket will close automatically and secure the DIMM to the socket. See **Figure 5-6**.

**Step 4:** **Removing a DIMM**. To remove a DIMM, push both handles outward. The memory module is ejected by a mechanism in the socket.

### 5.3.4 CF Card Installation

Note:

The PICOe-9452 can support both CF Type I cards and CF Type II cards. For the complete specifications of the supported CF cards please refer to **Chapter 2**.

To install the a CF card (Type 1 or Type 2) onto the PICOe-9452, please follow the steps below:

**Step 1:** **Locate the CF card socket**. Place the PICOe-9452 on an anti-static pad with the solder side facing up. Locate the CF card.

**Step 2:** **Align the CF card**. Make sure the CF card is properly aligned with the CF socket.

**Step 3:** **Insert the CF card**. Gently insert the CF card into the socket making sure the socket pins are properly inserted into the socket. See **Figure 5-7**.

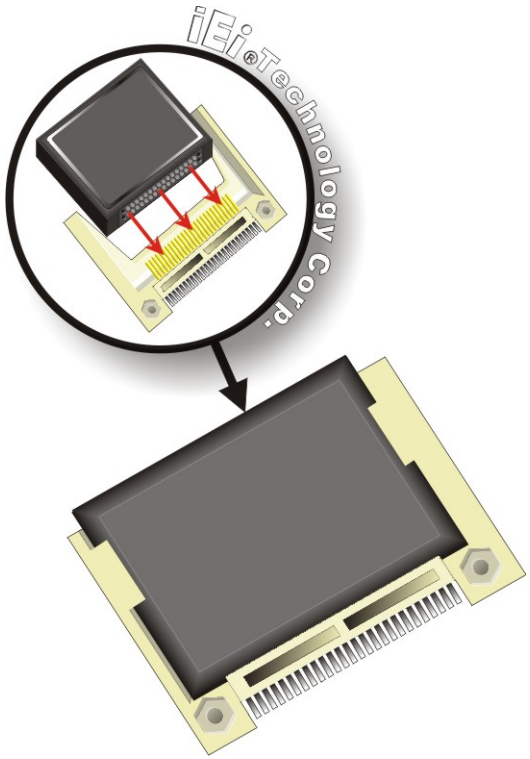

**Figure 5-7: CF Card Installation**

## 5.4 Jumper Settings

**NOTE:**

A jumper is a metal bridge used to close an electrical circuit. It consists of two or three metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.

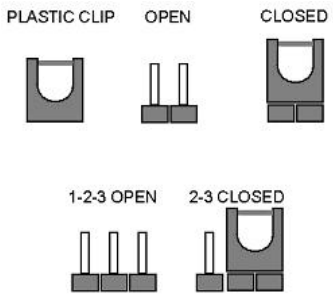


**Figure 5-8: Jumper Locations**

Before the PICOe-9452 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the PICOe-9452 are listed in **Table 5-1**.

| Description | Label | Type |
|---|---|---|
| CF card setup | J_CF1 | 3-pin header |
| Clear CMOS | J_CMOS1 | 3-pin header |
| LVDS voltage selection | J_VLVDS1 | 3-pin header |

**Table 5-1: Jumpers**

### 5.4.1 CF Card Setup

**Jumper Label:** J_CF1

**Jumper Type:** 3-pin header

**Jumper Settings:** See Table 5-2

**Jumper Location:** See Figure 5-9

The CF Card Setup jumper sets the CF Type I card or CF Type II cards as either the slave device or the master device. CF Card Setup jumper settings are shown in **Table 5-2**.

| AT Power Select | Description | |
|---|---|---|
| Short 1-2 | Slave | Default |
| Short 2-3 | Master | |

**Table 5-2: CF Card Setup Jumper Settings**

The CF Card Setup jumper location is shown in **Figure 5-9**.

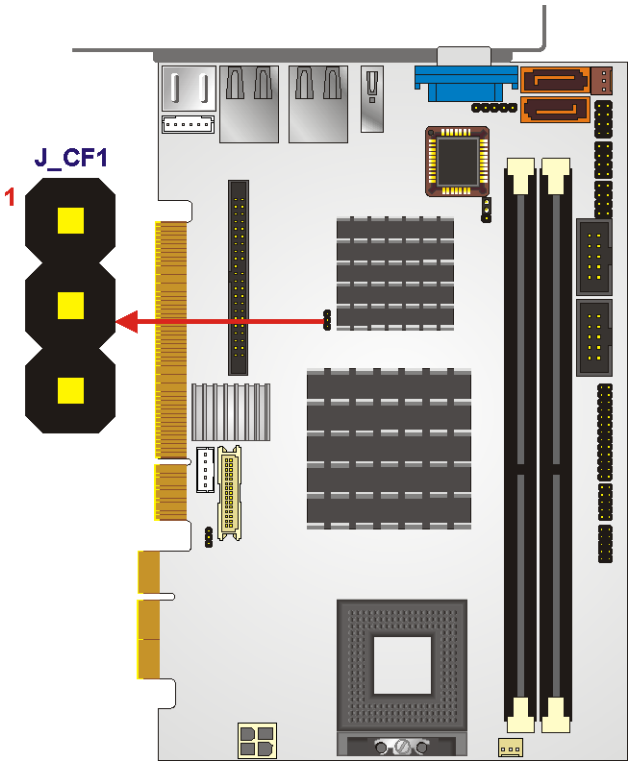


**Figure 5-9: CF Card Setup Jumper Location**

### 5.4.2 Clear CMOS Jumper

| | |
|---|---|
| **Jumper Label:** | J_CMOS1 |
| **Jumper Type:** | 3-pin header |
| **Jumper Settings:** | See Table 5-3 |
| **Jumper Location:** | See Figure 5-10 |

If the PICOe-9452 fails to boot due to improper BIOS settings, the clear CMOS jumper clears the CMOS data and resets the system BIOS information. To do this, use the jumper cap to close pins 2 and 3 for a few seconds then reinstall the jumper clip back to pins 1 and 2.

If the “CMOS Settings Wrong” message is displayed during the boot up process, the fault may be corrected by pressing the F1 to enter the CMOS Setup menu. Do one of the following:

- Enter the correct CMOS setting
- Load Optimal Defaults
- Load Failsafe Defaults.

After having done one of the above, save the changes and exit the CMOS Setup menu.

The clear CMOS jumper settings are shown in **Table 5-3**.

| AT Power Select | Description | |
|---|---|---|
| Short 1 - 2 | Keep CMOS Setup | Default |
| Short 2 - 3 | Clear CMOS Setup | |

**Table 5-3: Clear CMOS Jumper Settings**

The location of the clear CMOS jumper is shown in **Figure 5-10** below.

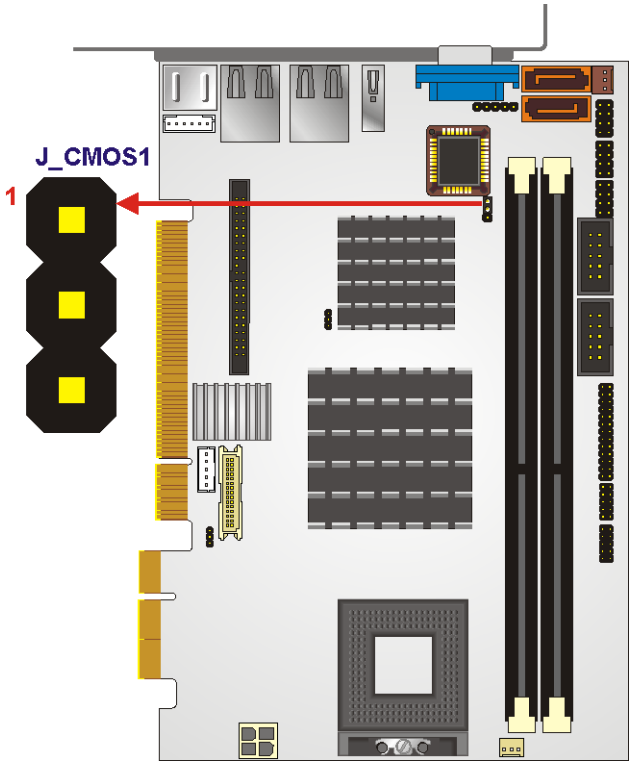


**Figure 5-10: Clear CMOS Jumper**

### 5.4.3 LVDS Voltage Selection

**WARNING:**

Permanent damage to the screen and PICOe-9452 may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that cam with the monitor to select the correct voltage.

| | |
|---|---|
| **Jumper Label:** | J_LVDS1 |
| **Jumper Type:** | 3-pin header |
| **Jumper Settings:** | See Table 5-4 |
| **Jumper Location:** | See Figure 5-11 |

The **LVDS Voltage Selection** jumper allows the LVDS screen voltage to be set. The **LVDS Voltage Selection** jumper settings are shown in **Table 5-4**.

| AT Power Select | Description | |
|---|---|---|
| Short 1-2 | +3V LVDS | Default |
| Short 2-3 | +5V LVDS | |

**Table 5-4: LVDS Voltage Selection Jumper Settings**

The LVDS Voltage Selection jumper location. is shown in **Figure 5-11**.

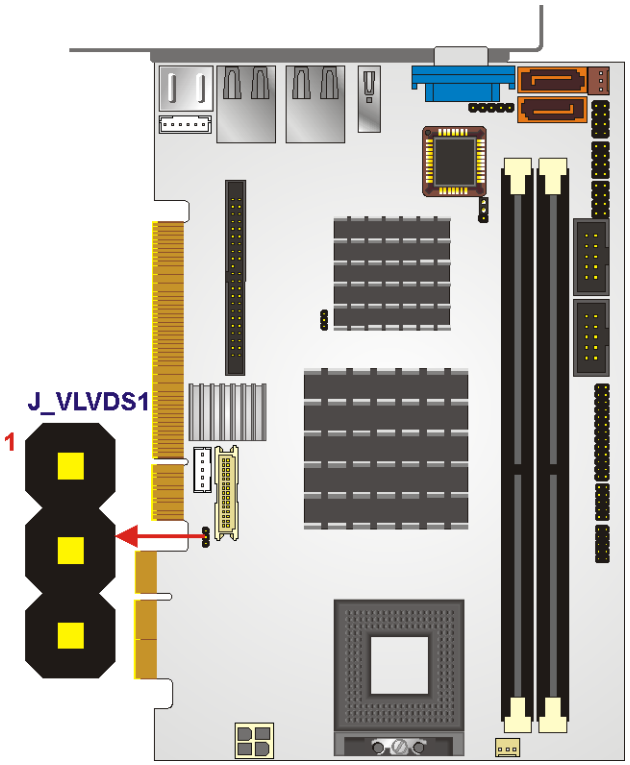


**Figure 5-11: LVDS Voltage Selection Jumper Pinout Locations**

## 5.5 Chassis Installation

### 5.5.1 Airflow

WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the PICOe-9452 must have air vents to allow cool air to move into the system and hot air to move out.

The PICOe-9452 must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

NOTE:

IEI has a wide range of chassis available. Please refer to **Chapter 2** in this manual or contact your PICOe-9452 vendor, reseller or an IEI sales representative at sales@iei.com.tw or visit the IEI website (http://www.ieiworld.com.tw) to find out more about the available chassis.

## 5.6 Internal Peripheral Device Connections

### 5.6.1 Peripheral Device Cables

The cables listed in **Table 5-5** are shipped with the PICOe-9452.

| Quantity | Type |
|---|---|
| 1 | IDE Cable |
| 1 | KB/MS cable |
| 1 | Dual RS-232 cable |
| 2 | SATA drive cables |
| 1 | SATA drive power cable |
| 1 | Dual USB cable |

**Table 5-5: IEI Provided Cables**

Optional cables are listed below:

- 7.1 channel audio kit
- 5.1 channel audio kit
- LPT cable
- S-video cable

### 5.6.2 IDE Cable Connection

The IDE flat cable connects to the PICOe-9452 to one or two IDE devices. To connect an IDE HDD to the PICOe-9452 please follow the instructions below.

**Step 1:** **Locate the IDE connector**. The location/s of the IDE device connector/s is/are shown in **Chapter 3**..

**Step 2:** **Insert the connector**. Connect the IDE cable connector to the onboard connector. See **Figure 5-12**. A key on the front of the cable connector ensures it can only be inserted in one direction.

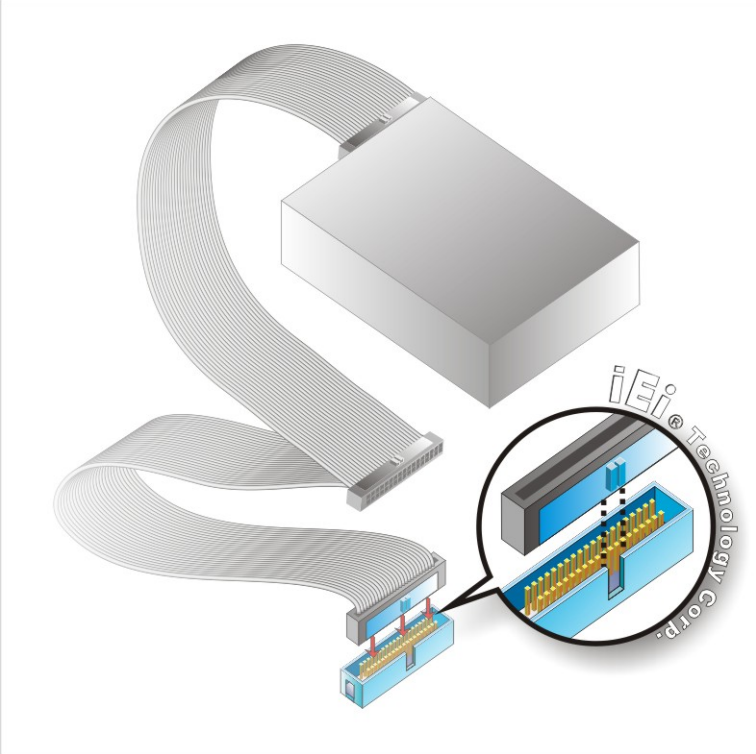

**Figure 5-12: IDE Cable Connection**

**Step 3:** **Connect the cable to an IDE device**. Connect the two connectors on the other side of the cable to one or two IDE devices. Make sure that pin 1 on the cable corresponds to pin 1 on the connector

### 5.6.3 5.1 Channel Audio Kit Installation

**NOTE:**

This is an optional item that must be ordered separately. For further information please contact the nearest PICOe-9452 distributor, reseller or vendor or contact an iEi sales representative directly. Send any queries to sales@iei.com.tw.

The optional 5.1 channel audio kit connects to the 10-pin audio connector on the PICOe-9452. The audio kit consists of three audio jacks. One audio jack, Mic In, connects to a microphone. The remaining two audio jacks, Line-In and Line-Out, connect to two speakers. To install the audio kit, please refer to the steps below:

**Step 1:** **Connect the audio kit cable.** The audio kit is shipped with a cable that connects the audio kit to the PICOe-9452. Connect the cable to the connector on the back of the audio kit. Make sure the pins are properly aligned (i.e. pin 1 connects to pin 1).

**Step 2:** **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

**Step 3:** **Align pin 1**. Align pin 1 on the onboard connector with pin 1 on the audio kit cable connector. Pin 1 on the audio kit cable connector is indicated with a white dot. See **Figure 5-13**.

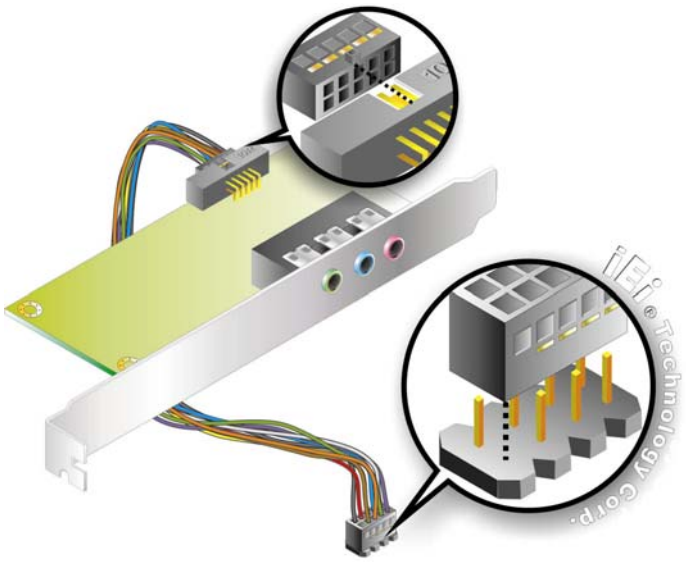

**Figure 5-13: 5.1 Channel Audio Kit**

**Step 4:** **Mount the audio kit onto the chassis**. Once the audio kit is connected to the PICOe-9452, secure the audio kit bracket to the system chassis.

**Step 5:** **Connect the audio devices**. Connect one speaker to the line-in audio jack, one speaker to the line-out audio jack and a microphone to the mic-in audio jack.

**Step 6:** **Install the driver**. If the 5.1 channel audio kit is used, the ALC655 Realtek codec driver must be installed. Refer to **Chapter 7** for driver installation instructions.

### 5.6.4 7.1 Channel Audio Kit Installation

**NOTE:**

This is an optional item that must be ordered separately. For further information please contact the nearest PICOe-9452 distributor, reseller or vendor or contact an iEi sales representative directly. Send any queries to sales@iei.com.tw.

The optional 7.1 channel audio kit connects to the 10-pin audio connector on the PICOe-9452. The audio kit consists of five audio jacks. One audio jack, Mic In, connects to a microphone. The remaining four audio jacks, Line-In, Front-Out, Rear-Out, and Center Subwoofer, connect to speakers. To install the audio kit, please refer to the steps below:

**Step 1:** **Connect the audio kit cable.** The audio kit is shipped with a cable that connects the audio kit to the PICOe-9452. Connect the cable to the connector on the back of the audio kit. Make sure the pins are properly aligned (i.e. pin 1 connects to pin 1).

**Step 2:** **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

**Step 3:** **Align pin 1**. Align pin 1 on the onboard connector with pin 1 on the audio kit cable connector. Pin 1 on the audio kit cable connector is indicated with a white dot. See **Figure 5-13**.

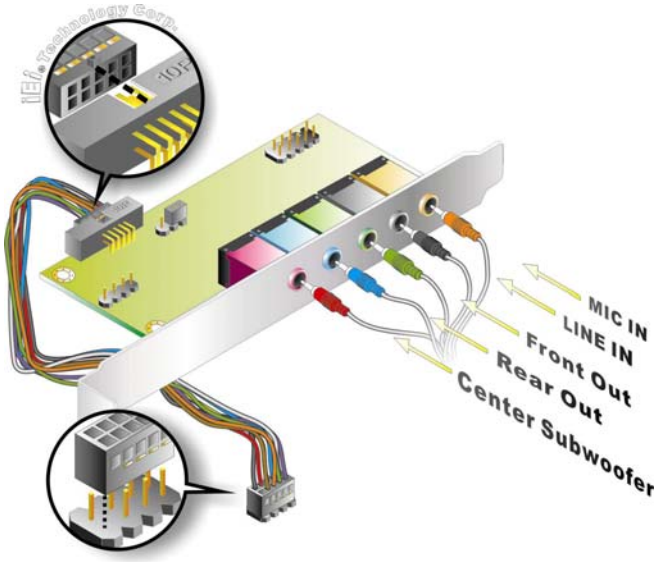


**Figure 5-14: 5.1 Channel Audio Kit**

**Step 4:** **Mount the audio kit onto the chassis**. Once the audio kit is connected to the PICOe-9452, secure the audio kit bracket to the system chassis.

**Step 5:** **Connect the audio devices**. Connect one speaker to the line-in audio jack, one speaker to the line-out audio jack and a microphone to the mic-in audio jack.

**Step 6:** **Install the driver**. If the 5.1 channel audio kit is used, the ALC655 Realtek codec driver must be installed. Refer to **Chapter 7** for driver installation instructions.

### 5.6.5 Keyboard/Mouse Y-cable Connector

The PICOe-9452 is shipped with a keyboard/mouse Y-cable connector. The keyboard/mouse Y-cable connector connects to a keyboard/mouse connector on the PICOe-9452 and branches into two cables that are each connected to a PS/2 connector, one for a mouse and one for a keyboard. To connect the keyboard/mouse Y-cable connector please follow the steps below.

**Step 1:** **Locate the connector**. The location of the keyboard/mouse Y-cable connector is shown in **Chapter 3**.

**Step 2:** **Align the connectors**. Correctly align pin 1 on the cable connector with pin 1 on the PICOe-9452 keyboard/mouse connector. See **Figure 5-15**.

**Step 3:** **Insert the cable connectors** Once the cable connector is properly aligned with the keyboard/mouse connector on the PICOe-9452, connect the cable connector to the onboard connectors. See **Figure 5-15**.

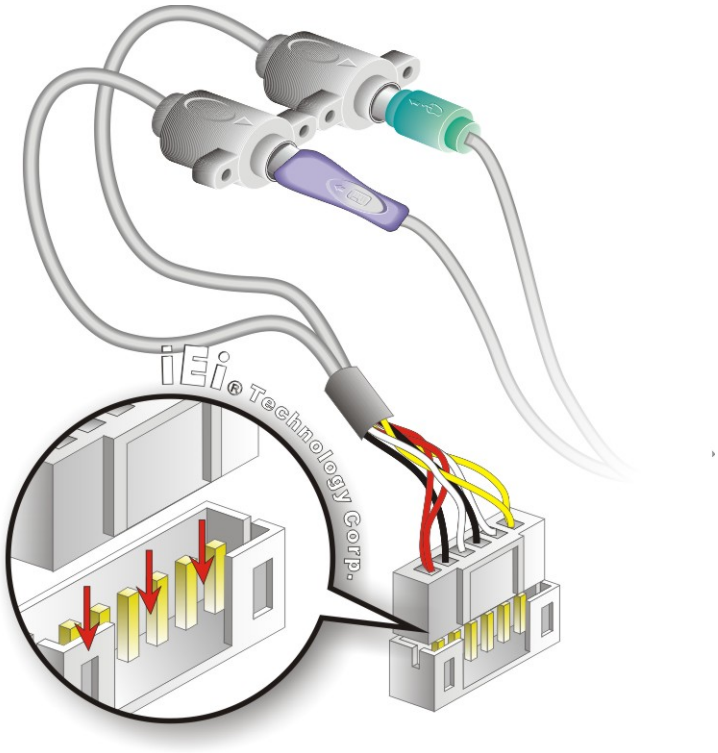


**Figure 5-15: Keyboard/mouse Y-cable Connection**

**Step 4:** **Attach PS/2 connectors to the chassis**. The keyboard/mouse Y-cable connector is connected to two PS/2 connectors. To secure the PS/2 connectors to the chassis please refer to the installation instructions that came with the chassis.

**Step 5:** **Connect the keyboard and mouse**. Once the PS/2 connectors are connected to the chassis, a keyboard and mouse can each be connected to one of the PS/2 connectors. The keyboard PS/2 connector and mouse PS/2 connector are both marked. Please make sure the keyboard and mouse are connected to the correct PS/2 connector.

### 5.6.6 Parallel Port Cable without Bracket

The optional parallel port (LPT) cable respectively connects the onboard LPT 26-pin box header to an external LPT device (like a printer). The cable comprises a 26-pin female header, to be connected to the onboard LPT box-header, on one side and on the other

side a standard external LPT connector. To connect the LPT cable, please follow the steps below.

**Step 1:** **Locate the connector**. The LPT connector location is shown in **Chapter 4**.

**Step 2:** **Align the connectors**. Correctly align pin 1 on the cable connector with pin 1 on the PCIE-9452 LPT box-header connector. See Error! Reference source not found..

**Step 3:** **Insert the cable connectors** Once the cable connector is properly aligned with the 26-pin box-header connector on the PCIE-9452, connect the cable connector to the onboard connector. See **Figure 5-16.**

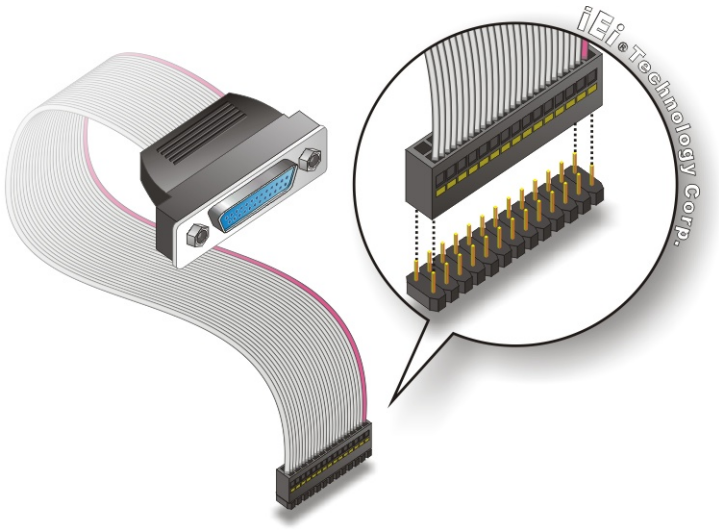

**Figure 5-16: LPT Cable Connection**

**Step 4:** **Attach the LPT connector to the chassis**. To secure the LPT interface connector to the chassis please refer to the installation instructions that came with the chassis.

**Step 5:** **Connect LPT device**. Once the LPT interface connector is connected to the chassis, the LPT device can be connected to the LPT interface connector. See **Figure 5-17**

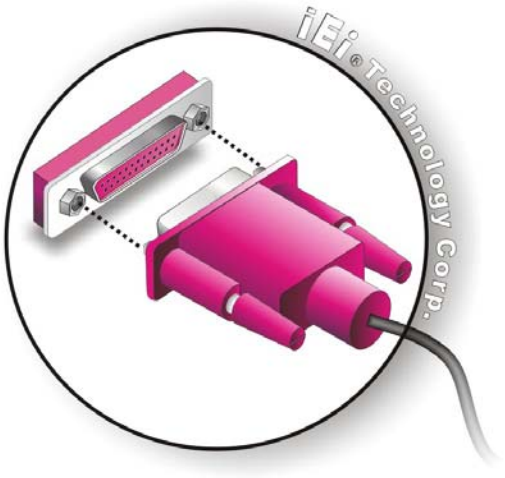

**Figure 5-17: Connect the LPT Device**

### 5.6.7 Dual RS-232 Cable with Slot Bracket

The dual RS-232 cable slot connector consists of two connectors attached to two independent cables. Each cable is then attached to a D-sub 9 male connector that is mounted onto a slot. To install the dual RS-232 cable, please follow the steps below.

**Step 1:** **Locate the connectors**. The locations of the RS-232 connectors are shown in **Chapter 3**.

**Step 2:** **Insert the cable connectors**. Insert one connector into each serial port box headers. See **Figure 5-18**. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

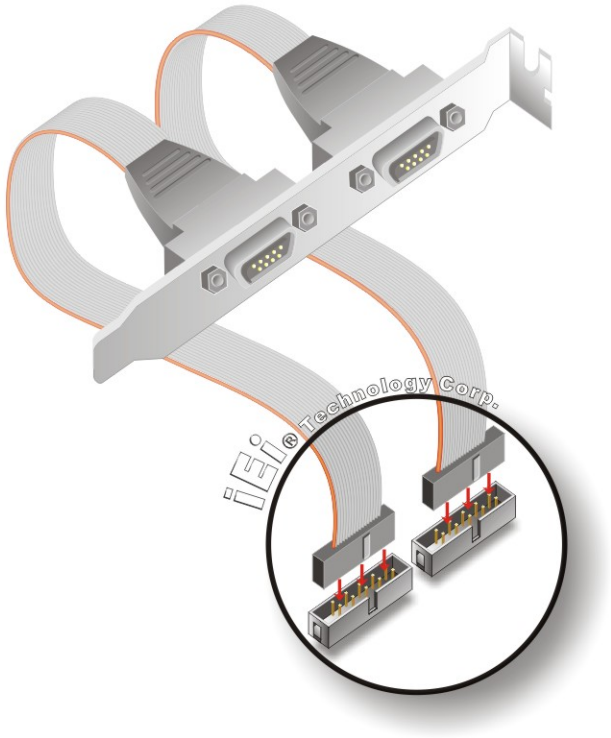

**Figure 5-18: Dual RS-232 Cable Installation**

**Step 3:** **Secure the bracket**. The dual RS-232 connector has two D-sub 9 male connectors secured on a bracket. To secure the bracket to the chassis please refer to the reference material that came with the chassis

### 5.6.8 SATA Drive Connection

The PICOe-9452 is shipped with two SATA drive cables and one SATA drive power cable. To connect the SATA drives to the connectors, please follow the steps below.

**Step 1:** **Locate the connectors**. The locations of the SATA drive connectors are shown

in **Chapter 3**.

**Step 2:** **Insert the cable connector**. Press the clip on the connector at the end of the SATA cable and insert the cable connector into the onboard SATA drive connector. See **Figure 5-19**.

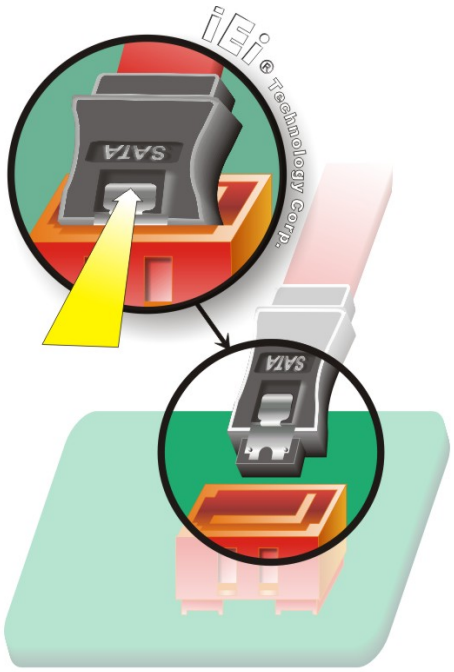


**Figure 5-19: SATA Drive Cable Connection**

**Step 3:** **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 5-20**.

**Step 4:** **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 5-20**.

**Figure 5-20: SATA Power Drive Connection**

### 5.6.9 USB Cable (Dual Port) with Slot Bracket

The PICOe-9452 is shipped with a dual port USB 2.0 cable. To connect the USB cable connector, please follow the steps below.

**Step 1:** **Locate the connectors**. The locations of the USB connectors are shown in **Chapter 3**.

**WARNING:**

If the USB pins are not properly aligned, the USB device can burn out.

**Step 2:** **Align the connectors**. The cable has two connectors. Correctly align pin 1on each cable connector with pin 1 on the PICOe-9452 USB connector.

**Step 3:** **Insert the cable connectors** Once the cable connectors are properly aligned with the USB connectors on the PICOe-9452, connect the cable connectors to the onboard connectors. See **Figure 5-21**.

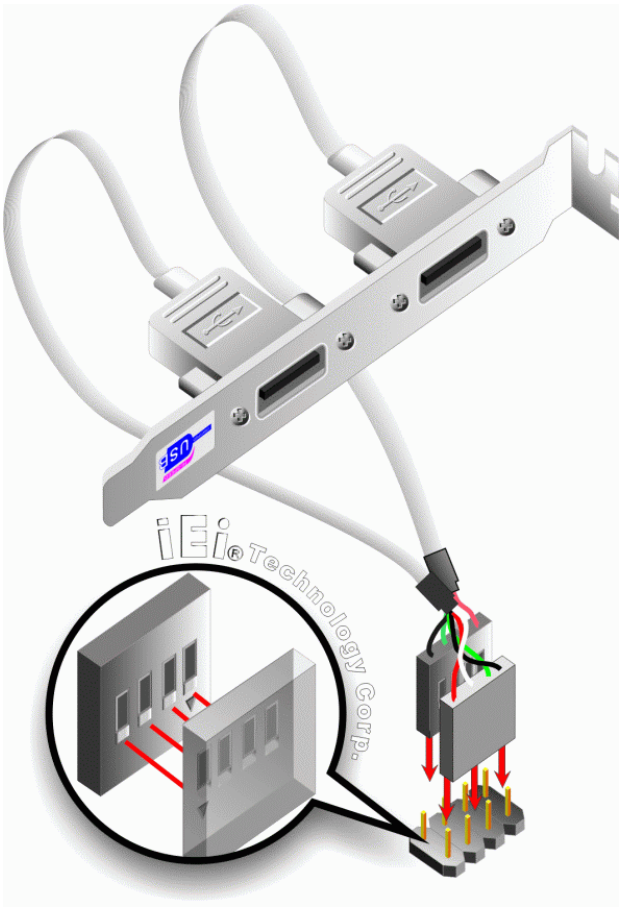

**Figure 5-21: Dual USB Cable Connection**

**Step 4:** **Attach the bracket to the chassis**. The USB 2.0 connectors are attached to a bracket. To secure the bracket to the chassis please refer to the installation.

## 5.7 External Peripheral Interface Connection

The following external peripheral devices can be connected to the external peripheral interface connectors.

- RJ-45 Ethernet cable connectors
- S-video display device
- USB device
- VGA monitor

To install these devices, connect the corresponding cable connector from the actual device to the corresponding PICOe-9452 external peripheral interface connector making sure the pins are properly aligned.

### 5.7.1 LAN Connection (Single Connector)

There are two external RJ-45 LAN connectors. The RJ-45 connectors enable connection to an external network. To connect a LAN cable with an RJ-45 connector, please follow the instructions below.

**Step 1:** **Locate the RJ-45 connectors**. The locations of the USB connectors are shown in **Chapter 4**.

**Step 2:** **Align the connectors.** Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the PICOe-9452. See **Figure 5-22**.

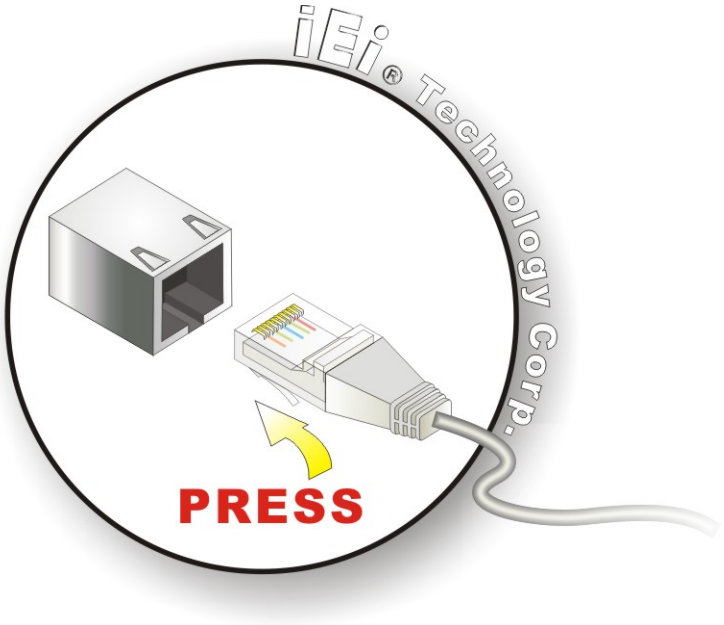


**Figure 5-22: LAN Connection**

**Step 3:** **Insert the LAN cable RJ-45 connector.** Once aligned, gently insert the LAN cable RJ-45 connector into the onboard RJ-45 connector.

### 5.7.2 S-video Cable Connection

There is a single mini DIN TV out connector mounted on the CPU card as an external connector. The optional S-video cable is able to connect the mini DIN connector on the system with an external display device. To connect an external display device to the system through the mini DIN connector with the S-video cable, please follow the instruction below.

**Step 1:** **Locate the TV-OUT DIN connector**. The location of the TV-OUT DIN connector is shown in **Chapter 4**.

**Step 2:** **Align the connectors.** Align the connector on the end of the S-video cable with the mini DIN connector. See **Figure 5-23**.

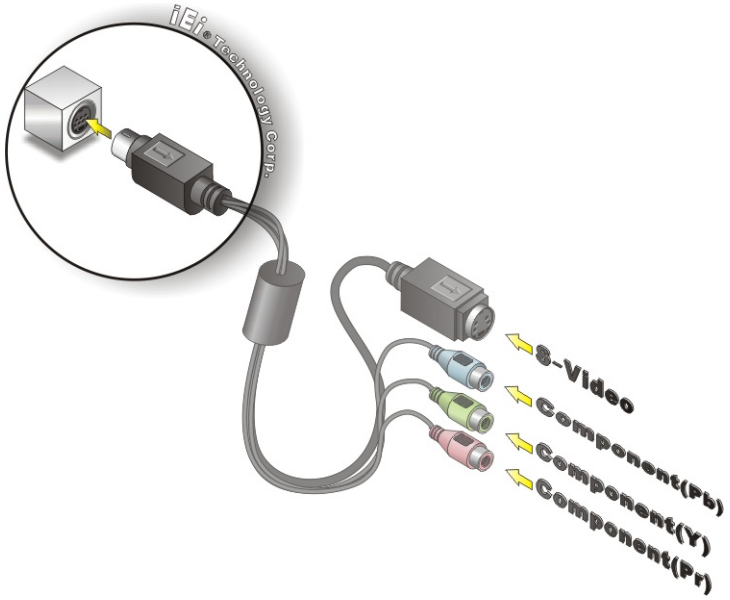


**Figure 5-23: S-video Cable Connector**

**Step 3:** **Insert S-video cable connector.** Once aligned, gently insert the S-video cable connector into the onboard connector.

**Step 4:** **Connect the cables to the display device.** Connect the S-video connector and the Pb, Y and Pr component connectors on the other end of the S-video cables to the respective connectors on the display device.

### 5.7.3 USB Device Connection (Single Connector)

There are two external USB 2.0 connectors. Both connectors are perpendicular to the PICOe-9452. To connect a USB 2.0 or USB 1.1 device, please follow the instructions below.

**Step 1:** **Located the USB connectors**. The locations of the USB connectors are shown in **Chapter 4**.

**Step 2:** **Align the connectors.** Align the USB device connector with one of the connectors on the PICOe-9452. See Figure 5-24.

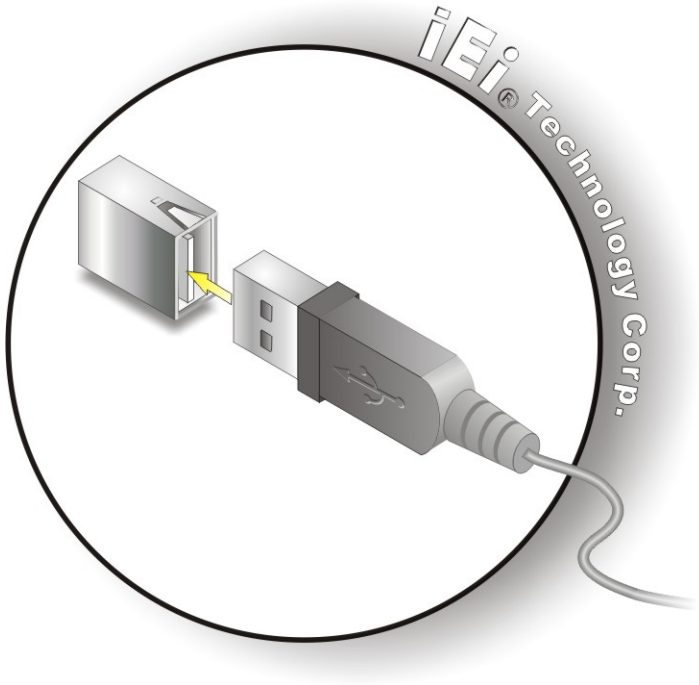


**Figure 5-24: USB Device Connection**

**Step 3:** **Insert the device connector.** Once aligned, gently insert the USB device connector into the onboard connector.

### 5.7.4 VGA Monitor Connection

The PICOe-9452 has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the PICOe-9452, please follow the instructions below.

**Step 1:** **Locate the female DB-15 connector**. The location of the female DB-15 connector is shown in **Chapter 3**.

**Step 2:** **Align the VGA connector**. Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.

**Step 3:** **Insert the VGA connector** Once the connectors are properly aligned with the insert the male connector from the VGA screen into the female connector on the PICOe-9452. See **Figure 5-25**.

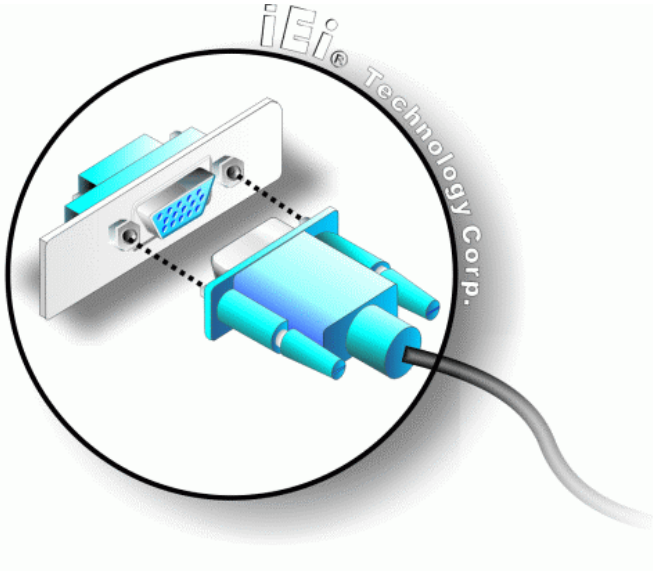

**Figure 5-25: VGA Connector**

**Step 4:** **Secure the connector**. Secure the DB-15 VGA connector from the VGA monitor to the external interface by tightening the two retention screws on either side of the connector.

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Chapter

6

# AMI BIOS

## 6.1 Introduction

A licensed copy of AMI BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

### 6.1.1 Starting Setup

The AMI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DELETE** key as soon as the system is turned on or
2. Press the **DELETE** key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before the **DELETE** key is pressed, restart the computer and try again.

### 6.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in.

| Key | Function |
|---|---|
| Up arrow | Move to previous item |
| Down arrow | Move to next item |
| Left arrow | Move to the item on the left hand side |
| Right arrow | Move to the item on the right hand side |
| Esc key | Main Menu – Quit and not save changes into CMOS<br>Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu |
| Page Up key | Increase the numeric value or make changes |
| Page Dn key | Decrease the numeric value or make changes |

| Key | Function |
|---|---|
| F1 key | General help, only for Status Page Setup Menu and Option Page Setup Menu |
| F2 /F3 key | Change color from total 16 colors. F2 to select color forward. |
| F10 key | Save all the CMOS changes, only for Main Menu |

**Table 6-1: BIOS Navigation Keys**

### 6.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

### 6.1.4 Unable to Reboot After Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper described in **Chapter 5**.

### 6.1.5 BIOS Menu Bar

The **menu bar** on top of the BIOS screen has the following main items:

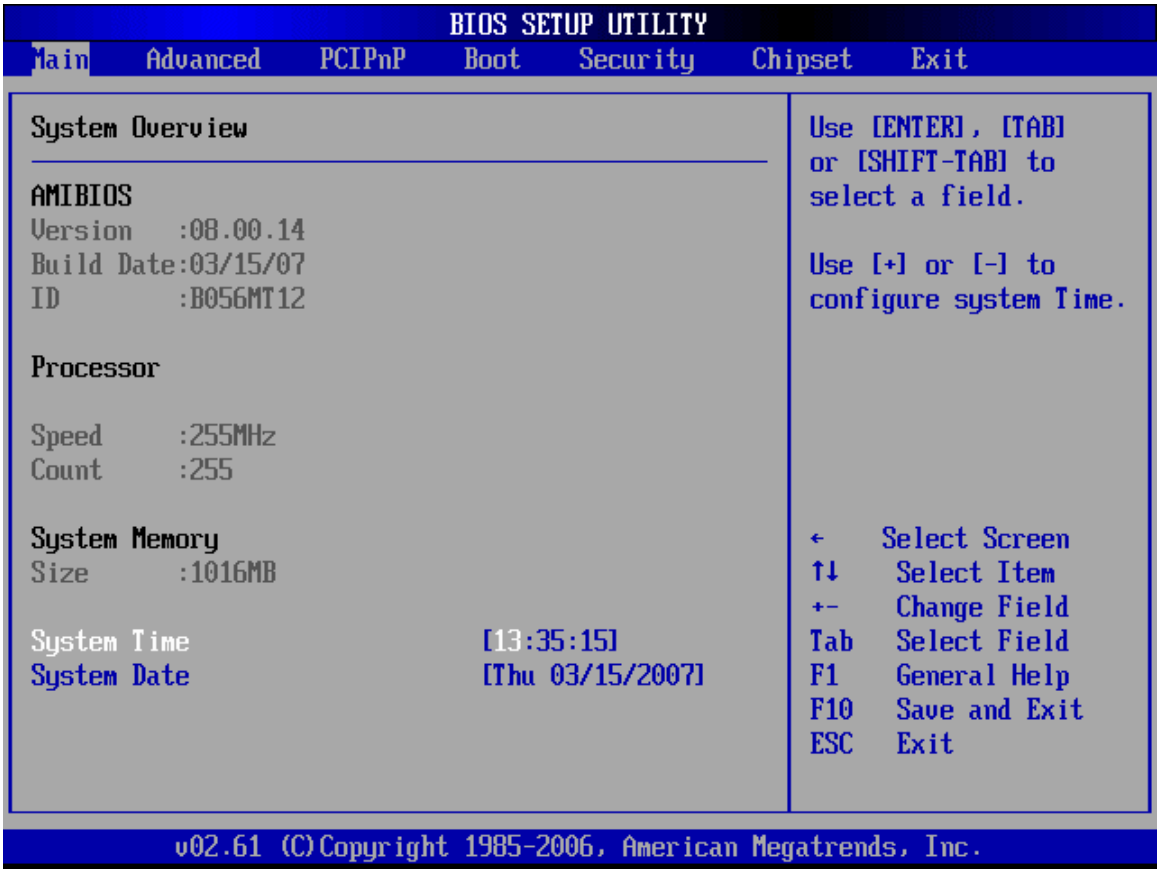
- **Main** Changes the basic system configuration.
- **Advanced** Changes the advanced system settings.
- **PCIPnP** Changes the advanced PCI/PnP Settings
- **Boot** Changes the system boot configuration.
- **Security** Sets User and Supervisor Passwords.
- **Chipset** Changes the chipset settings.
- **Power** Changes power management settings.
- **Exit** Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

## 6.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered.

The **Main** menu gives an overview of the basic system information.




**BIOS Menu 1: Main**

### ➔ System Overview

The **System Overview** lists a brief summary of different system components. The fields in **System Overview** cannot be changed. The items shown in the system overview include:

- **AMI BIOS**: Displays auto-detected BIOS information
  - **Version**: Current BIOS version
  - **Build Date**: Date the current BIOS version was made
  - **ID**: Installed BIOS ID

- **Processor**: Displays auto-detected CPU specifications
  - **Type**: Names the currently installed processor
  - **Speed**: Lists the processor speed
  - **Count**: The number of CPUs on the motherboard
- **System Memory**: Displays the auto-detected system memory.
  - **Size**: Lists memory size

The **System Overview** field also has two user configurable fields:

➔ **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

➔ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

## 6.3 Advanced

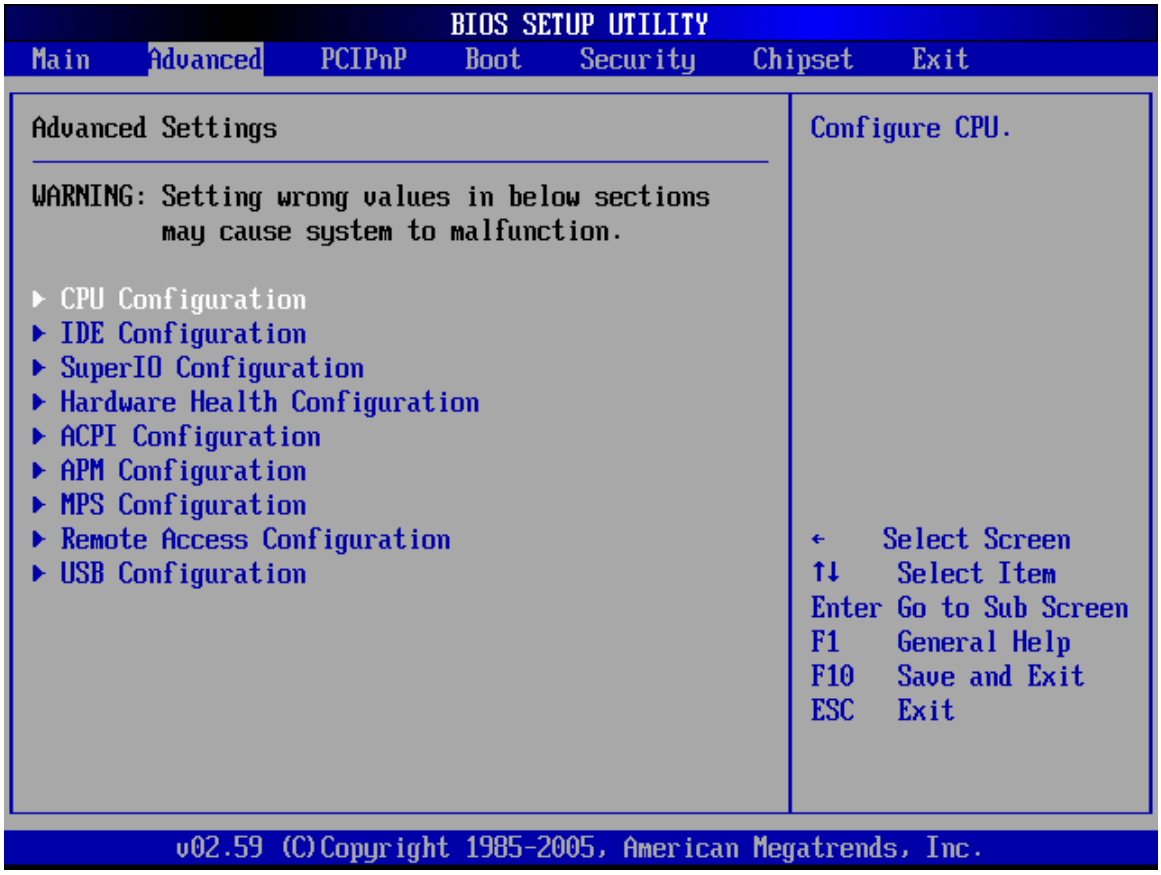
Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

WARNING:

Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

- **CPU Configuration** (see **Section 6.3.1**)
- **IDE Configuration** (see **Section 6.3.2**)
- **SuperIO Configuration** (see **Section 6.3.3**)
- **Hardware Health Configuration** (see **Section 6.3.4**)
- **ACPI Configuration** (see **Section 6.3.5**)

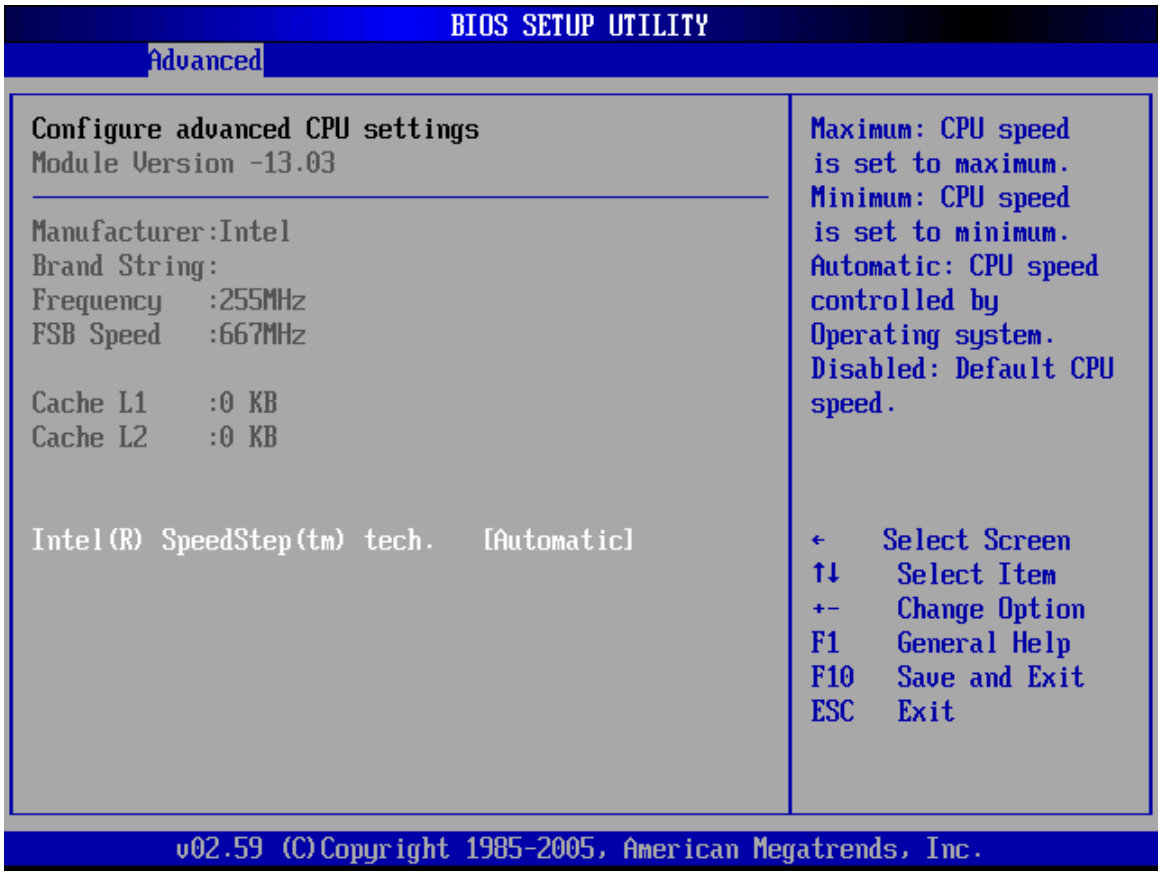
- **APM Configuration** (See **Section 6.3.6**)
- **MPS Configuration** (see **Section 6.3.6**)
- **Remote Access Configuration** (see **Section 6.3.8**)
- **USB Configuration** (see **Section 6.3.8**)




**BIOS Menu 2: Advanced**

## 6.3.1 CPU Configuration

Use the **CPU Configuration** menu (BIOS Menu 3) to view detailed CPU specifications and configure the CPU.




**BIOS Menu 3: CPU Configuration**

The CPU Configuration menu (BIOS Menu 3) lists the following CPU details:

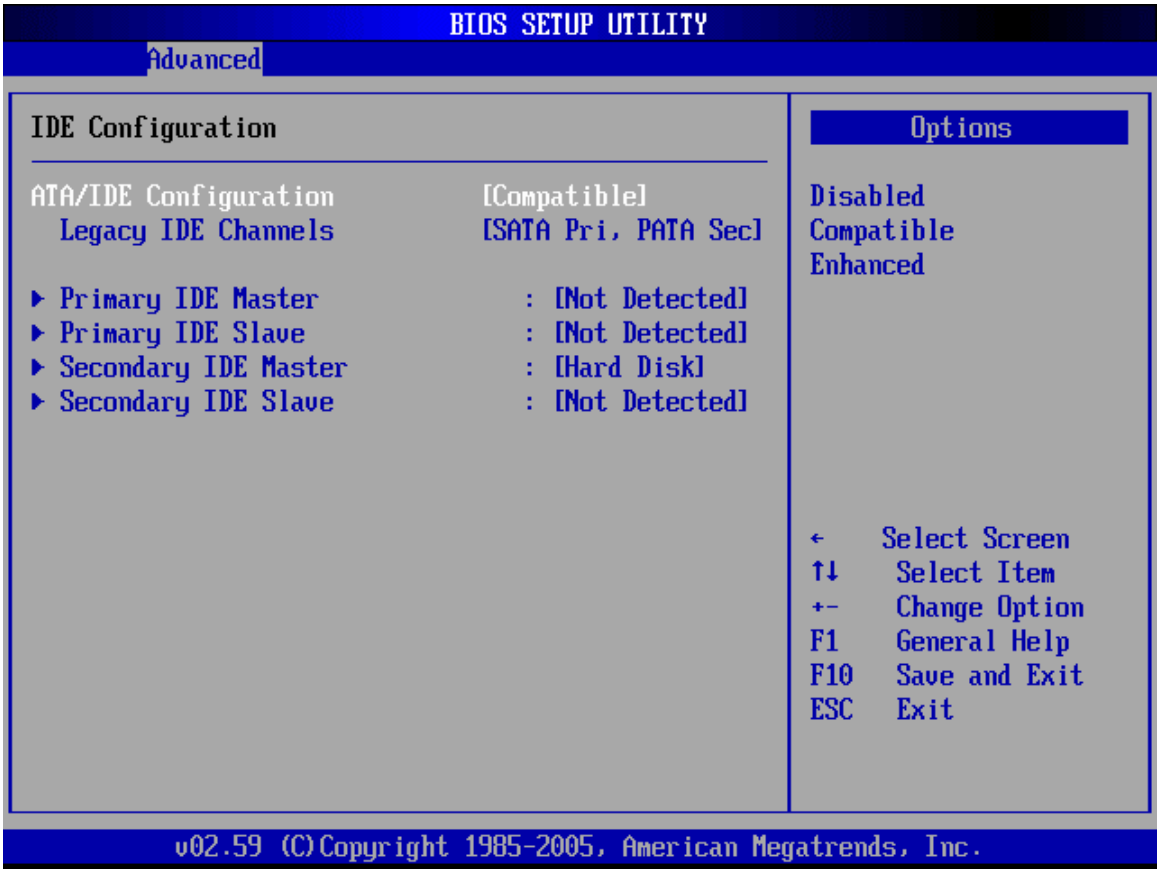
- **Manufacturer**: Lists the name of the CPU manufacturer
- **Brand String**: Lists the brand name of the CPU being used
- **Frequency:** Lists the CPU processing speed
- **FSB Speed**: Lists the FSB speed
- **Cache L1**: Lists the CPU L1 cache size
- **Cache L2**: Lists the CPU L2 cache size

The following **CPU Configuration** menu items can be configured.

- Intel ® SpeedStep ™ tech.

### 6.3.2 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 4**) to change and/or set the configuration of the IDE devices installed in the system.




**BIOS Menu 4: IDE Configuration**

➔ **ATA/IDE Configurations [Compatible]**

- ➔ **Disabled** (Default)
- ➔ **Compatible**
- ➔ **Enhanced**

➔ **Legacy IDE Channels [PATA Pri, SATA Sec]**

➔ **SATA Only**

➔ **SATA Pri, PATA Sec (Default)**

➔ **SATA Only**

➔ **IDE Master and IDE Slave**

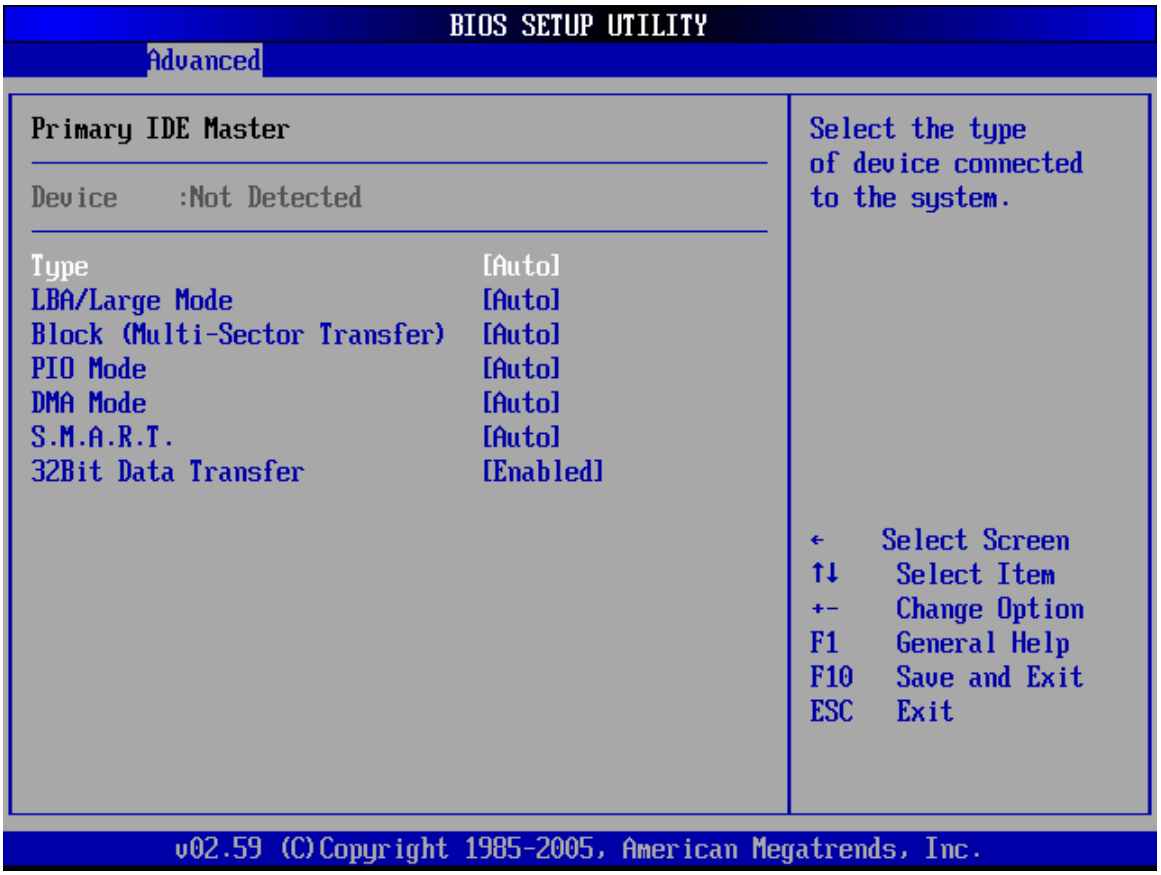
When entering setup, BIOS auto detects the presence of IDE devices. BIOS displays the status of the auto detected IDE devices. The following IDE devices are detected and are shown in the **IDE Configuration** menu:

- Primary IDE Master
- Primary IDE Slave
- Secondary IDE Master
- Secondary IDE Slave

The **IDE Configuration** menu (**BIOS Menu 4**) allows changes to the configurations for the IDE devices installed in the system. If an IDE device is detected, and one of the above listed four BIOS configuration options are selected, the IDE configuration options shown in **Section 6.3.2.1** appear.

### 6.3.2.1 IDE Master, IDE Slave

Use the **IDE Master** and **IDE Slave** configuration menu to view both primary and secondary IDE device details and configure the IDE devices connected to the system.




**BIOS Menu 5: IDE Master and IDE Slave Configuration**

➔ **Auto-Detected Drive Parameters**

The “grayed-out” items in the left frame are IDE disk drive parameters automatically detected from the firmware of the selected IDE disk drive. The drive parameters are listed as follows:

- **Device**: Lists the device type (e.g. hard disk, CD-ROM etc.)
- **Type**: Indicates the type of devices a user can manually select
- **Vendor**: Lists the device manufacturer
- **Size**: List the storage capacity of the device.
- **LBA Mode**: Indicates whether the LBA (Logical Block Addressing) is a method of addressing data on a disk drive is supported or not.
- **Block Mode**: Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per

interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt.

- **PIO Mode**: Indicates the PIO mode of the installed device.
- **Async DMA**: Indicates the highest Asynchronous DMA Mode that is supported.
- **Ultra DMA**: Indicates the highest Synchronous DMA Mode that is supported.
- **S.M.A.R.T.**: Indicates whether or not the Self-Monitoring Analysis and Reporting Technology protocol is supported.
- **32Bit Data Transfer**: Enables 32-bit data transfer.

➔ **Type [Auto]**

Use the **Type** BIOS option select the type of device the AMIBIOS attempts to boot from after the Power-On Self-Test (POST) is complete.

➔ **Not Installed** BIOS is prevented from searching for an IDE disk drive on the specified channel.

➔ **Auto** **DEFAULT** The BIOS auto detects the IDE disk drive type attached to the specified channel. This setting should be used if an IDE hard disk drive is attached to the specified channel.

➔ **CD/DVD** The CD/DVD option specifies that an IDE CD-ROM drive is attached to the specified IDE channel. The BIOS does not attempt to search for other types of IDE disk drives on the specified channel.

➔ **ARMD** This option specifies an ATAPI Removable Media Device. These include, but are not limited to:

- ➔ **ZIP**
- ➔ **LS-120**

➔ **LBA/Large Mode [Auto]**

Use the **LBA/Large Mode** option to disable or enable BIOS to auto detects LBA (Logical Block Addressing). LBA is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB.

| | | |
|---|---|---|
| ➔ **Disabled** | | BIOS is prevented from using the LBA mode control on the specified channel. |
| ➔ **Auto** | **DEFAULT** | BIOS auto detects the LBA mode control on the specified channel. |

➔ **Block (Multi Sector Transfer) [Auto]**

Use the **Block (Multi Sector Transfer)** to disable or enable BIOS to auto detect if the device supports multi-sector transfers.

| | | |
|---|---|---|
| ➔ **Disabled** | | BIOS is prevented from using Multi-Sector Transfer on the specified channel. The data to and from the device occurs one sector at a time. |
| ➔ **Auto** | **DEFAULT** | BIOS auto detects Multi-Sector Transfer support on the drive on the specified channel. If supported the data transfer to and from the device occurs multiple sectors at a time. |

➔ **PIO Mode [Auto]**

Use the **PIO Mode** option to select the IDE PIO (Programmable I/O) mode program timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.

| | | |
|---|---|---|
| ➔ **Auto** | **DEFAULT** | BIOS auto detects the PIO mode. Use this value if the IDE disk drive support cannot be determined. |

- ➔ **0** PIO mode 0 selected with a maximum transfer rate of 3.3MBps
- ➔ **1** PIO mode 1 selected with a maximum transfer rate of 5.2MBps
- ➔ **2** PIO mode 2 selected with a maximum transfer rate of 8.3MBps
- ➔ **3** PIO mode 3 selected with a maximum transfer rate of 11.1MBps
- ➔ **4** PIO mode 4 selected with a maximum transfer rate of 16.6MBps

  (This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.)

➔ **DMA Mode [Auto]**

Use the **DMA Mode** BIOS selection to adjust the DMA mode options.

- ➔ **Auto** **DEFAULT** BIOS auto detects the DMA mode. Use this value if the IDE disk drive support cannot be determined.
- ➔ **SWDMA0** Single Word DMA mode 0 selected with a maximum data transfer rate of 2.1MBps
- ➔ **SWDMA1** Single Word DMA mode 1 selected with a maximum data transfer rate of 4.2MBps
- ➔ **SWDMA2** Single Word DMA mode 2 selected with a maximum data transfer rate of 8.3MBps
- ➔ **MWDMA0** Multi Word DMA mode 0 selected with a maximum data transfer rate of 4.2MBps
- ➔ **MWDMA1** Multi Word DMA mode 1 selected with a maximum data transfer rate of 13.3MBps
- ➔ **MWDMA2** Multi Word DMA mode 2 selected with a maximum data transfer rate of 16.6MBps

- **UDMA1** Ultra DMA mode 0 selected with a maximum data transfer rate of 16.6MBps
- **UDMA1** Ultra DMA mode 1 selected with a maximum data transfer rate of 25MBps
- **UDMA2** Ultra DMA mode 2 selected with a maximum data transfer rate of 33.3MBps
- **UDMA3** Ultra DMA mode 3 selected with a maximum data transfer rate of 44MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- **UDMA4** Ultra DMA mode 4 selected with a maximum data transfer rate of 66.6MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)
- **UDMA5** Ultra DMA mode 5 selected with a maximum data transfer rate of 99.9MBps (To use this mode, it is required that an 80-conductor ATA cable is used.)

➔ **S.M.A.R.T [Auto]**

Use the **S.M.A.R.T** option to auto-detect, disable or enable Self-Monitoring Analysis and Reporting Technology (SMART) on the drive on the specified channel. **S.M.A.R.T** predicts impending drive failures. The **S.M.A.R.T** BIOS option enables or disables this function.

- **Auto** **DEFAULT** BIOS auto detects HDD SMART support.
- **Disabled** Prevents BIOS from using the HDD SMART feature.
- **Enabled** Allows BIOS to use the HDD SMART feature

➔ **32Bit Data Transfer [Enabled]**

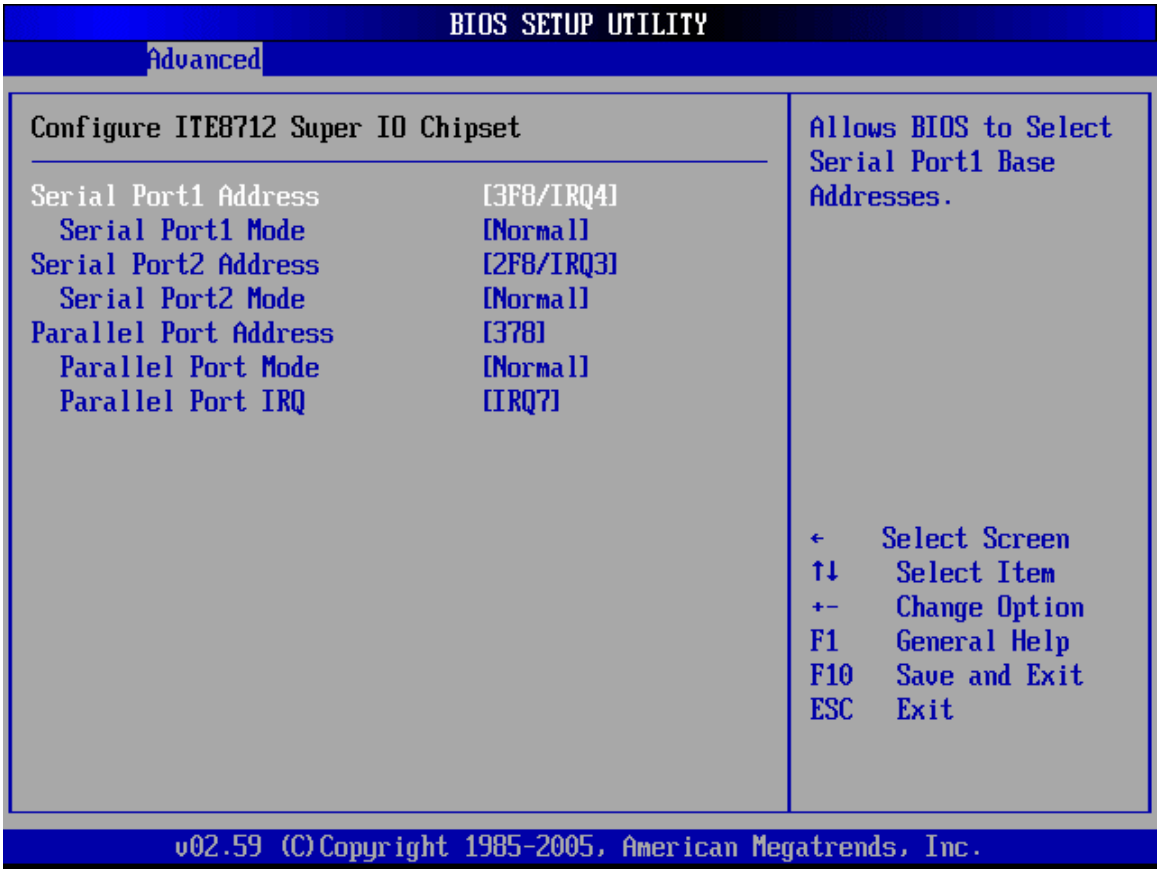
Use the **32Bit Data Transfer** BIOS option to enables or disable 32-bit data transfers.

➔ **Disabled** Prevents the BIOS from using 32-bit data transfers.

➔ **Enabled** **DEFAULT** Allows BIOS to use 32-bit data transfers on supported hard disk drives.

### 6.3.3 Super IO Configuration

Use the **Super IO Configuration** menu (**BIOS Menu 6**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.




**BIOS Menu 6: Super IO Configuration**

➔ **Serial Port1 Address [3F8/IRQ4]**

Use the **Serial Port1 Address** option to select the Serial Port 1 base address.

| | | |
|---|---|---|
| ➔ **Disabled** | | No base address is assigned to Serial Port 1 |
| ➔ **3F8/IRQ4** | **DEFAULT** | Serial Port 1 I/O port address is 3F8 and the interrupt address is IRQ4 |
| ➔ **3E8/IRQ4** | | Serial Port 1 I/O port address is 3E8 and the interrupt address is IRQ4 |
| ➔ **2E8/IRQ3** | | Serial Port 1 I/O port address is 2E8 and the interrupt address is IRQ3 |

➔ **Serial Port1 Mode [Normal]**

Use the **Serial Port1 Mode** option to select the transmitting and receiving mode for the first serial port.

| | | |
|---|---|---|
| ➔ **Normal** | (Default) | Serial Port 1 mode is normal |
| ➔ **ASK IR** | | Serial Port 1 mode is ASK IR |

➔ **Serial Port2 Address [2F8/IRQ3]**

Use the **Serial Port2 Address** option to select the Serial Port 2 base address.

| | | |
|---|---|---|
| ➔ **Disabled** | | No base address is assigned to Serial Port 2 |
| ➔ **2F8/IRQ3** | **DEFAULT** | Serial Port 2 I/O port address is 3F8 and the interrupt address is IRQ3 |
| ➔ **3E8/IRQ4** | | Serial Port 2 I/O port address is 3E8 and the interrupt address is IRQ4 |
| ➔ **2E8/IRQ3** | | Serial Port 2 I/O port address is 2E8 and the interrupt |

address is IRQ3

➔ **Serial Port2 Mode [Normal]**

Use the **Serial Port2 Mode** option to select the Serial Port2 operational mode.

| | | |
|---|---|---|
| ➔ **Normal** | **DEFAULT** | Serial Port 2 mode is normal |
| ➔ **IrDA** | | Serial Port 2 mode is IrDA |
| ➔ **ASK IR** | | Serial Port 2 mode is ASK IR |

➔ **Parallel Port Address [Disabled]**

Use the **Parallel Port Address** option to select the parallel port base address.

| | | |
|---|---|---|
| ➔ **Disabled** | **DEFAULT** | No base address is assigned to the Parallel Port |
| ➔ **378** | | Parallel Port I/O port address is 378 |
| ➔ **278** | | Parallel Port I/O port address is 278 |
| ➔ **3BC** | | Parallel Port I/O port address is 3BC |

➔ **Parallel Port Mode [Normal]**

Use the **Parallel Port Mode** option to select the mode the parallel port operates in.

| | | |
|---|---|---|
| ➔ **Normal** | **DEFAULT** | The normal parallel port mode is the standard mode for parallel port operation. |
| ➔ **Bi-directional** | | Parallel port outputs are 8-bits long. Inputs are accomplished by reading 4 of the 8 bits on the status register. |
| ➔ **EPP** | | The parallel port operates in the enhanced parallel port mode (EPP). The EPP mode supports bi-directional communication between the system |

and the parallel port device and the transmission rates between the two are much faster than the Normal mode.

**ECP** The parallel port operates in the extended capabilities port (ECP) mode. The ECP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the Normal mode

➔ **ECP+EPP** The parallel port is compatible with ECP and EPP devices described above

➔ **Parallel Port IRQ [IRQ7]**

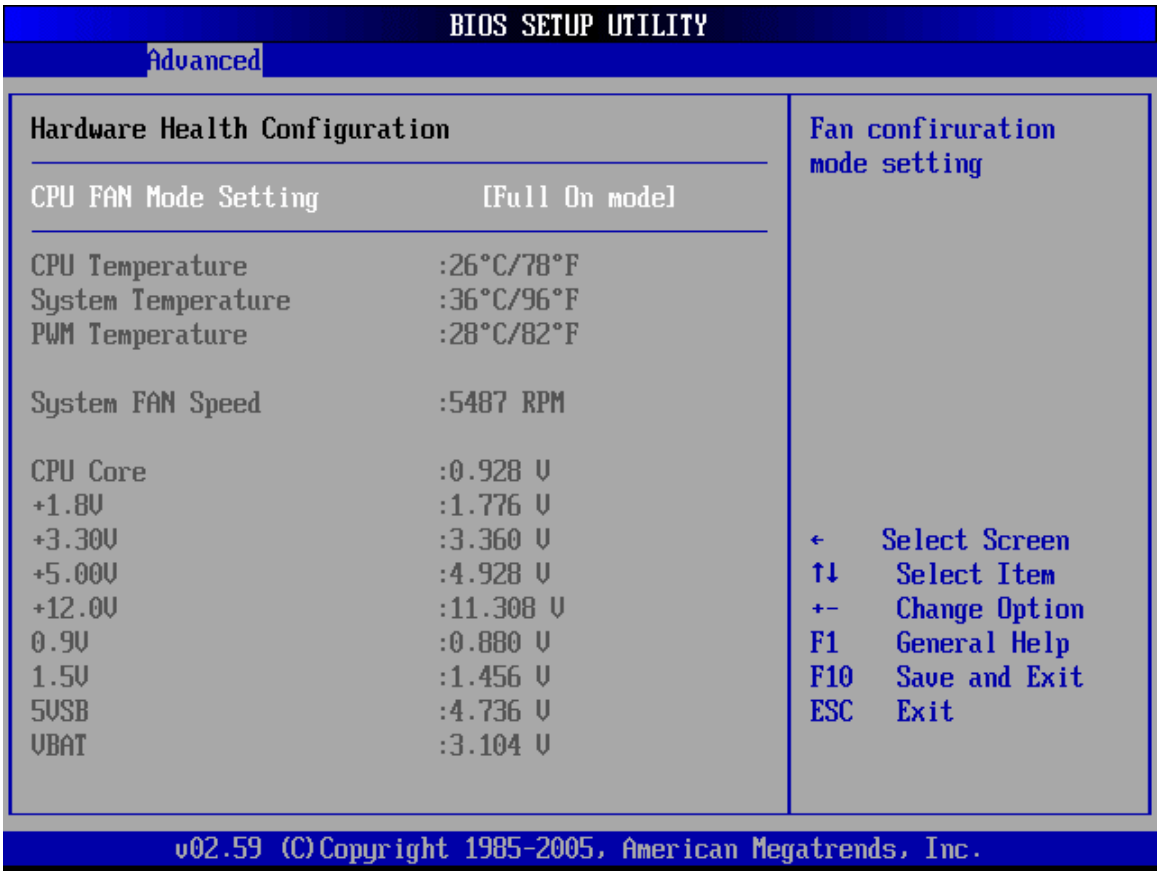
Use the **Parallel Port IRQ** option to set the parallel port interrupt address.

➔ **IRQ5** IRQ5 is assigned as the parallel port interrupt address

➔ **IRQ7** **DEFAULT** IRQ7 is assigned as the parallel port interrupt address

### 6.3.4 Hardware Health Configuration

The **Hardware Health Configuration** menu (**BIOS Menu 7**) shows the operating temperature, fan speeds and system voltages.




**BIOS Menu 7: Hardware Health Configuration**

➔ **CPU FAN Mode Setting [Full On Mode]**

Use the **CPU FAN Mode Setting** option to configure the second fan.

| | | |
|---|---|---|
| ➔ **Full On Mode** | **DEFAULT** | Fan is on all the time |
| ➔ **Automatic mode** | | Fan is off when the temperature is low enough. Parameters must be set by the user. |
| ➔ **PWM Manual mode** | | Pulse width modulation set manually |

When the **CPU FAN Mode Setting** option is in the **Automatic Mode**, the following parameters can be set.

- CPU Temp. Limit of OFF
- CPU Temp. Limit of Start
- CPU Temp. Limit of Full
- CPU Fan Start PWM
- Slope PWM 1

When the **CPU FAN Mode Setting** option is in the **PWM Manual Mode**, the following parameters can be set.

- CPU Fan PWM control

➔ **CPU Temp. Limit of OFF [000]**

**WARNING:**

Setting this value too high may cause the fan to stop when the CPU is at a high temperature and therefore cause the system to be damaged.

The **CPU Temp. Limit of OFF** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of OFF** option to select the CPU temperature at which the cooling fan should automatically turn off. To select a value, select the **CPU Temp. Limit of OFF** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU Temp. Limit of Start [020]**

**WARNING:**

Setting this value too high may cause the fan to start only when the CPU is at a high temperature and therefore cause the system to be

damaged.

The **CPU Temp. Limit of Start** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of Start** option to select the CPU temperature at which the cooling fan should automatically turn on. When the fan starts, it rotates using the starting pulse width modulation (PWM) specified in the **Fan 3 Start PWM** option below. To select a value, select the **CPU Temp. Limit of Start** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU Temp. Limit of Full [080]**

**WARNING:**

Setting this value too high may cause the fan to start rotating at full speed only when the CPU is at a high temperature and therefore cause the system to be damaged.

The **CPU Temp. Limit of Full** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **CPU Temp. Limit of Full** option to select the CPU temperature at which the cooling fan starts to rotate at full speed. When the CPU temperature exceeds the temperature specified in this option, the fan starts to rotate at full speed. To select a value, select the **CPU Temp. Limit of Full** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU Fan Start PWM [070]**

The **Fan 3 Start PWM** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **Fan 3 Start PWM** option to select the PWM mode the fan starts to rotate with after the temperature specified in the **Temperature 3 Limit of Start** is exceeded. The Super I/O chipset supports 128 PWM modes. To select a value, select the **Fan 3 Start PWM** option and enter a decimal number between 000 and 127. The temperature range is specified below.

- PWM Minimum Mode: 0
- PWM Maximum Mode: 127

➔ **Slope PWM 1 [1 PWM]**

The **Slope PWM 1** option can only be set if the **CPU FAN Mode Setting** option is set to **Automatic Mode**. Use the **Slope PWM 1** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. A list of available options is shown below:

- 0 PWM
- 1 PWM
- 2 PWM
- 4 PWM
- 8 PWM
- 16 PWM
- 32 PWM
- 64 PWM

➔ **CPU Fan PWM Control [070]**

The **CPU Fan PWM Control** option can only be set if the **CPU FAN Mode Setting** option is set to **Manual Mode**. Use the **CPU Fan PWM Control** option to select PWM duty cycle control. The PWM duty cycle specifies the width of the modulated pulse. A high value ensures a wide pulse and a low value ensures a narrow pulse. To select a value, select the **CPU Fan PWM Control** option and enter a decimal number between 000 and 127. The PWM Duty Cycle control range is specified below.

- PWM Minimum Mode: 0
- PWM Maximum Mode: 127

➔ **Hardware Health Monitoring**

Use the **Hardware Health Configuration** menu (**BIOS Menu 7**) monitor system environmental parameters. The following health parameters are monitored.

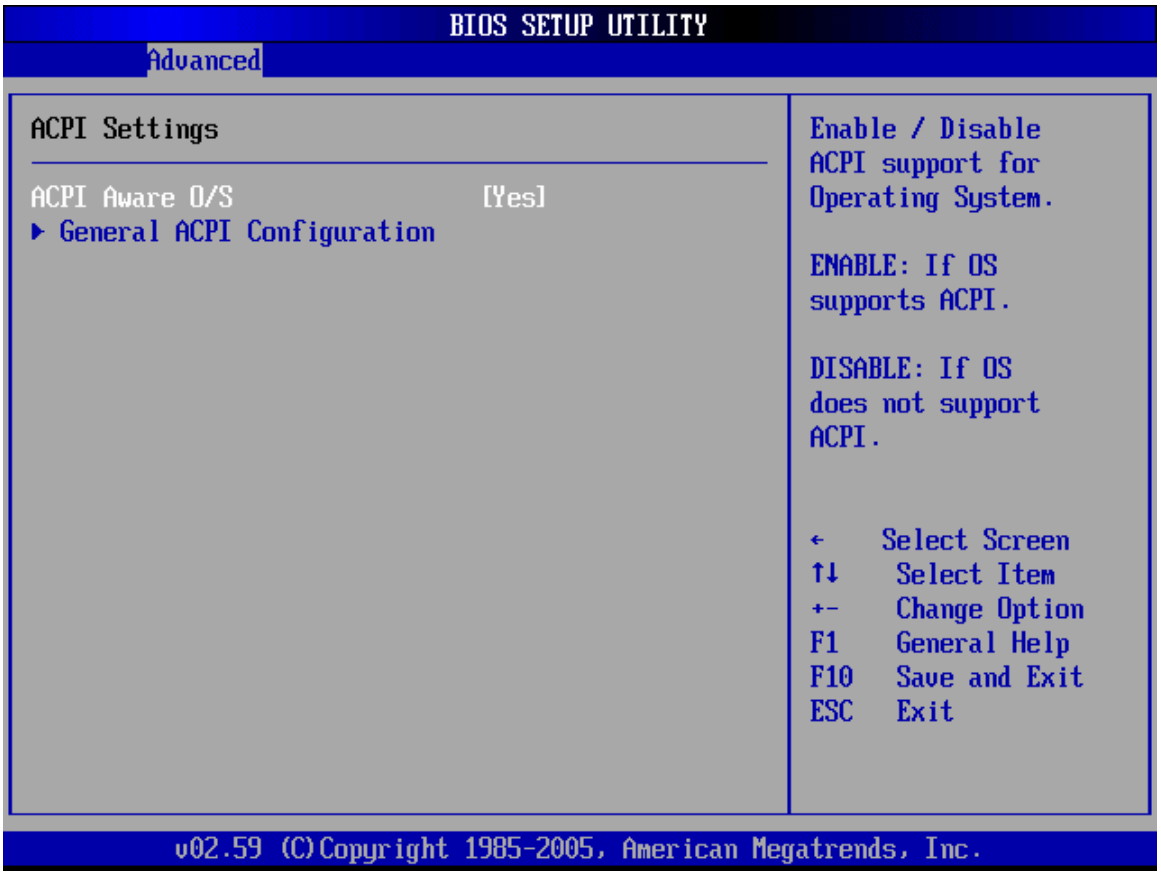
- **Temperature monitoring:** The following system temperatures are monitored:
  - CPU Temperature
  - System Temperature
  - PWM Temperature

- **Fan Speed Monitoring:** The following system fan speeds are monitored:
  - System FAN Speed

- **Voltage Monitoring:** The following system voltages are monitored:
  - CPU Core
  - +1.8V
  - +3.30V
  - +5.00V
  - +12.0V
  - 0.9V
  - 1.5V
  - 5VSB
  - VBAT

### 6.3.5 ACPI Configuration

The **ACPI Configuration** menu (**BIOS Menu 8**) configures the Advanced Configuration and Power Interface (ACPI) and Power Management (APM) options.




**BIOS Menu 8: ACPI Configuration**

➔ **ACPI Aware O/S [Yes]**

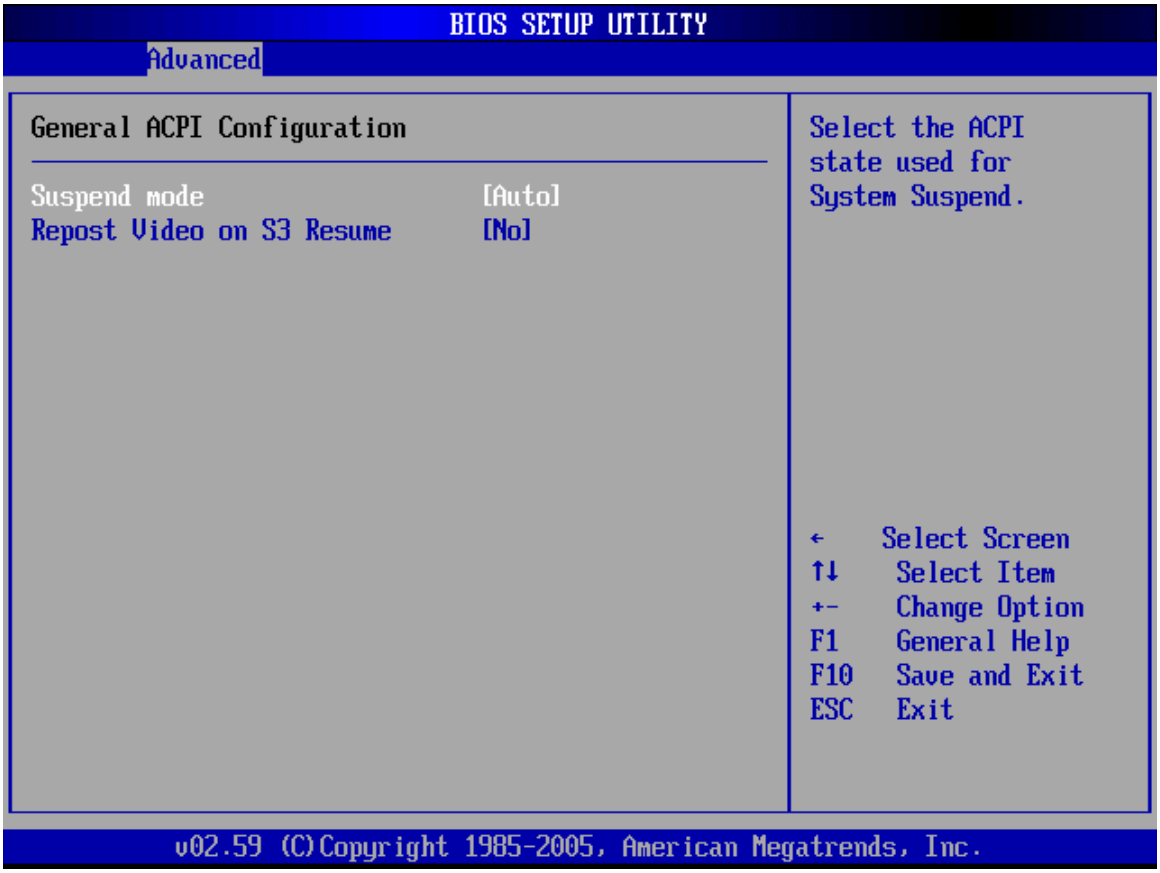
Use the **ACPI Aware O/S** option to enable the system to configure ACPI power saving options. ACPI can only be implemented if the system OS complies with the ACPI standard. Windows 98, Windows 2000, and Windows XP all comply with ACPI.

➔ **No** Disables the ACPI support for the OS. This selection should be disabled if the OS does not support ACPI

➔ **Yes** **DEFAULT** Enables the ACPI support for the operating system. This selection should be enabled if the OS does support ACPI

### 6.3.5.1 General ACPI Configuration

Use the General ACPI Configuration menu (BIOS Menu 9) to select the ACPI state when the system is suspended.




**BIOS Menu 9: General ACPI Configuration [Advanced\ ACPI Configuration]**

➔ **Suspend Mode [S1(POS)]**

Use the **Suspend Mode** option to specify the sleep state the system enters when it is not being used.

➔ **S1 (POS)** The system enters S1(POS) sleep state. The system appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.

➔ **S3 (STR)** The system enters a S3(STR) sleep state. The CPU has no power; RAM is in slow refresh; the power supply is in a reduced power mode.

➔ **Auto** **DEFAULT** The BIOS automatically selects a sleep state for the system.

➔ **Repost Video on S3 Resume [No]**

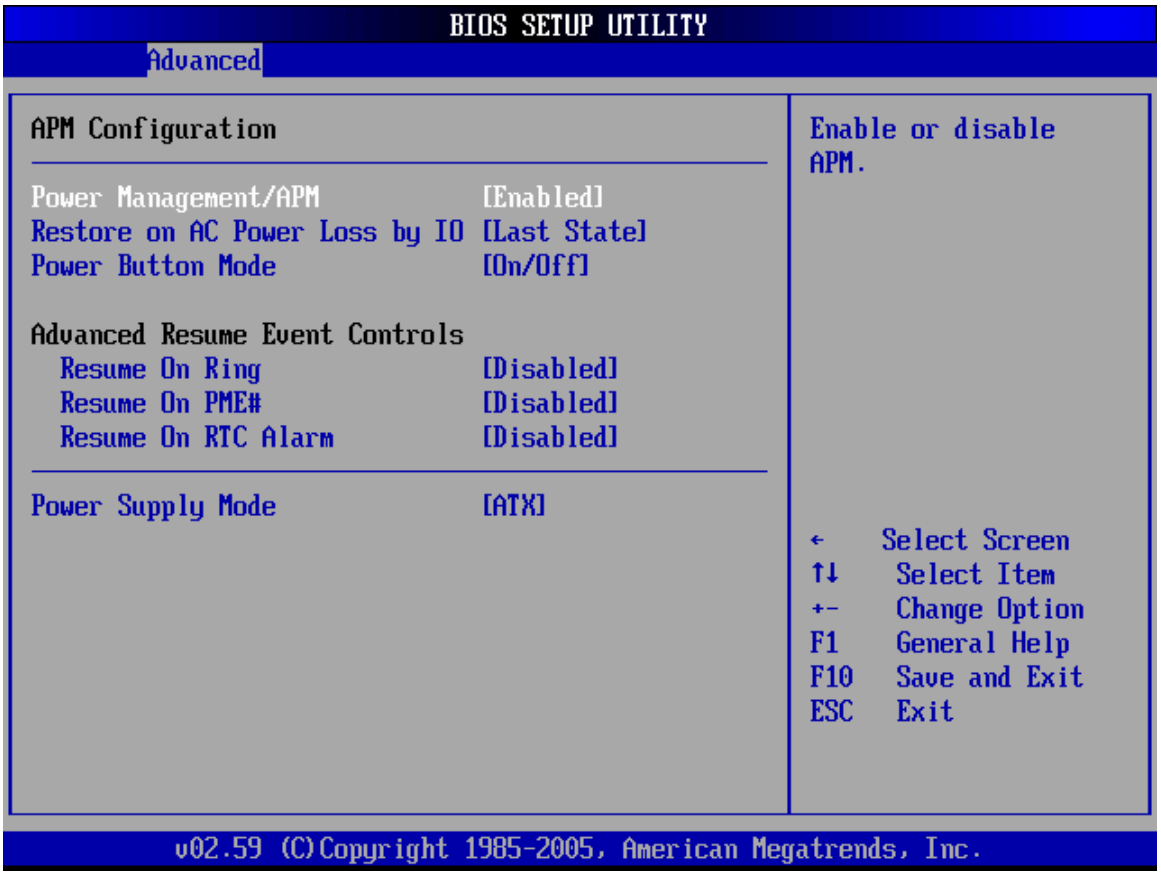
Use the **Repost Video on S3 Resume** to determine whether the VGA BIOS post will be invoked after the system is roused from an S3 (STR) suspend state.

➔ **No** **DEFAULT** The VGA BIOS post is not invoked

➔ **Yes** The VGA BIOS post is invoked

### 6.3.6 APM Configuration

The APM Configuration menu (BIOS Menu 10) allows the advanced power management options to be configured.




**BIOS Menu 10:Advanced Power Management Configuration**

➔ **Power Management/APM [Enabled]**

Use the **Power Management/APM** BIOS option to enable access to the advanced power management features. If this option is disabled, the only other option on the screen is the **Power Button Mode**.

➔ **Disabled** Disables the Advanced Power Management (APM) feature

➔ **Enabled** (Default) Enables the APM feature

➔ **Restore on AC Power Loss [Power Off]**

Use the **Restore on AC Power Loss** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

| | | |
|---|---|---|
| ➔ **Power Off** | | The system remains turned off |
| ➔ **Power On** | (Default) | The system turns on |
| ➔ **Last State** | | The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off. |

➔ **Power Button Mode [On/Off]**

Use the **Power Button Mode** BIOS to specify how the power button functions.

| | | |
|---|---|---|
| ➔ **On/Off** | (Default) | When the power button is pressed the system is either turned on or off |
| ➔ **Suspend** | | When the power button is pressed the system goes into suspend mode |

➔ **Resume on Ring [Disabled]**

Use the **Resume on Ring** BIOS option to enable activity on the RI (ring in) modem line to rouse the system from a suspend or standby state. That is, the system will be roused by an incoming call on a modem.

| | | |
|---|---|---|
| ➔ **Disabled** | (Default) | Wake event not generated by an incoming call |
| ➔ **Enabled** | | Wake event generated by an incoming call |

➔ **Resume on PME# [Disabled]**

Use the **Resume on PME#** BIOS option to enable activity on the PCI PME (power management event) controller to rouse the system from a suspend or standby state.

➔ **Disabled** (Default) Wake event not generated by PCI PME controller activity

➔ **Enabled** Wake event generated by PCI PME controller activity

➔ **Resume On RTC Alarm [Disabled]**

Use the **Resume On RTC Alarm** option to specify the time the system should be roused from a suspended state.

➔ **Disabled** (Default) The real time clock (RTC) cannot generate a wake event

➔ **Enabled** If selected, the following appears with values that can be selected:

- ➔ **RTC Alarm Date (Days)**
- ➔ **System Time**

After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

➔ **Power Supply Mode [ATX]**

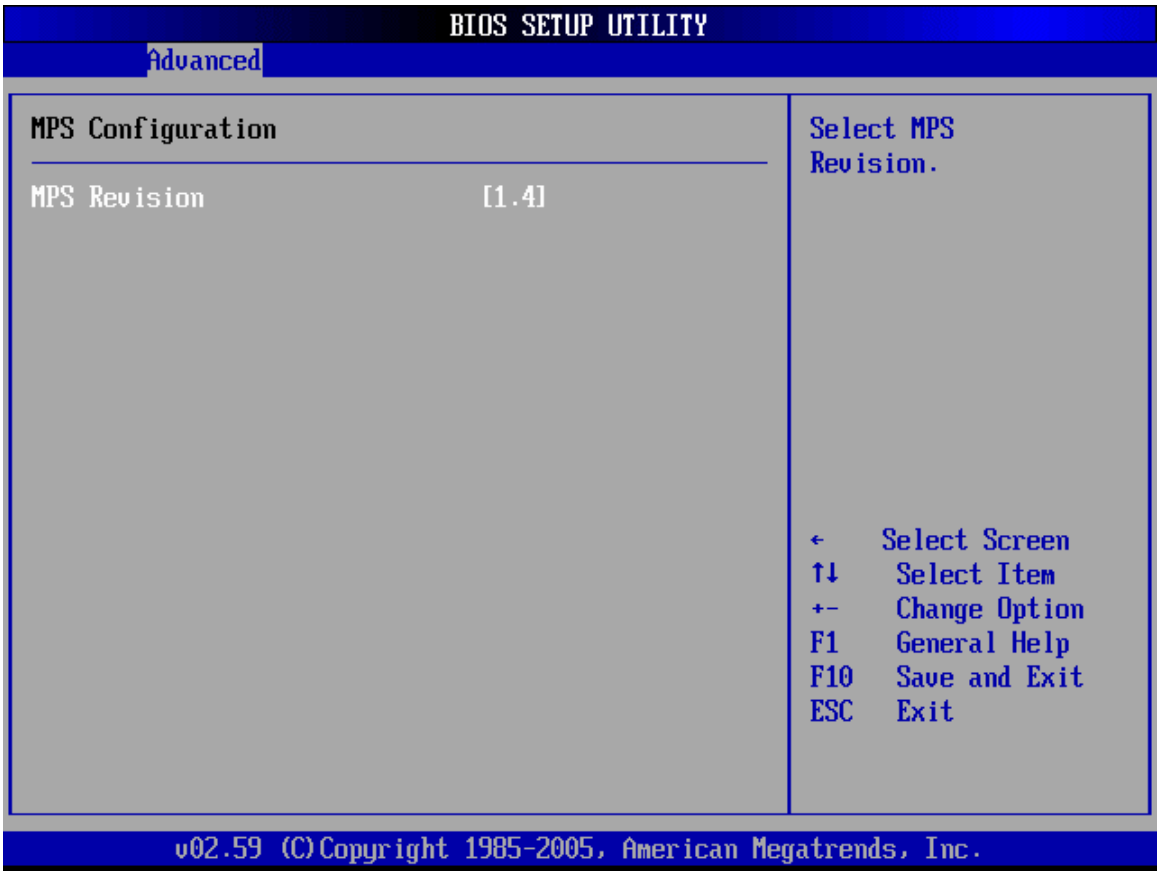
Use the **Power Supply Mode** BIOS option to to select the power supply that is connected to the system.

➔ **AT** An AT power supply is connected to the system

➔ **ATX** **DEFAULT** An ATX power supply is connected to the system

### 6.3.7 MPS Configuration

Use the MPS Configuration menu (BIOS Menu 11) to select `he multi-processor table.




**BIOS Menu 11: MPS Configuration**

➔ **MPS Revision [1.4]**

Use the **Multiprocessor Specification (MPS) for OS** option to specify the MPS version to be used.

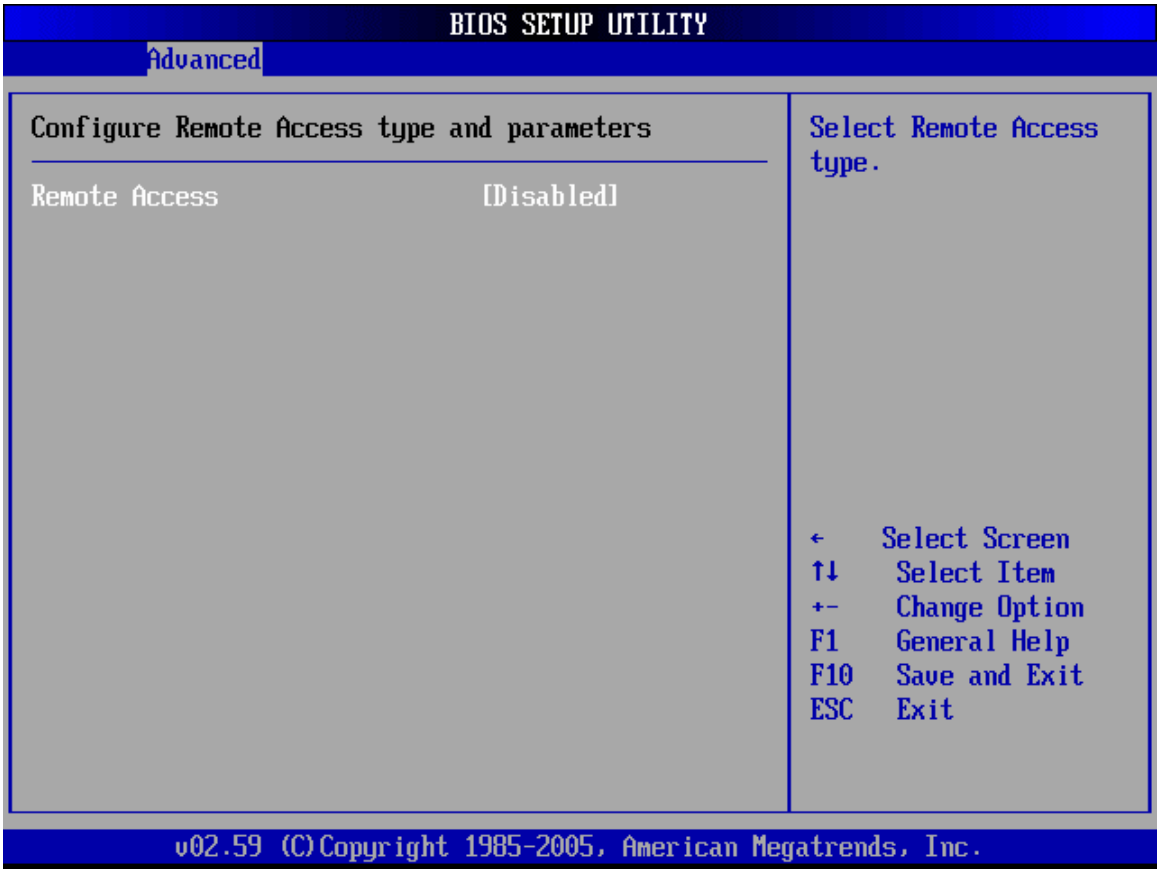
➔ **1.1** MPS version 1.1 is used

➔ **1.4** **DEFAULT** MPS version 1.4 is used

### 6.3.8 Remote Access Configuration

Use the **Remote Access Configuration** menu (**BIOS Menu 12**) to configure remote access parameters. The **Remote Access Configuration** is an AMIBIOS feature and

allows a remote host running a terminal program to display and configure the BIOS settings.




**BIOS Menu 12: Remote Access Configuration [Advanced]**

➔ **Remote Access [Disabled]**

Use the **Remote Access** option to enable or disable access to the remote functionalities of the system.

➔ **Disabled** **DEFAULT** Remote access is disabled.

➔ **Enabled** Remote access configuration options shown below appear:

➔ **Serial Port Number**

- ➔ **Serial Port Mode**
- ➔ **Flow Control**
- ➔ **Redirection after BIOS POST**
- ➔ **Terminal Type**
- ➔ **VT-UTF8 Combo Key Support**

These configuration options are discussed below.

➔ **Serial Port Number [COM1]**

Use the **Serial Port Number** option to select the serial port used for remote access.

| | | |
|---|---|---|
| ➔ **COM1** | **DEFAULT** | System is remotely accessed through COM1 |
| ➔ **COM2** | | System is remotely accessed through COM2 |

**NOTE**: Make sure the selected COM port is enabled through the Super I/O configuration menu.

➔ **Base Address, IRQ [3F8h,4]**

The **Base Address, IRQ** option cannot be configured and only shows the interrupt address of the serial port listed above.

➔ **Serial Port Mode [115200 8,n,1]**

Use the **Serial Port Mode** option to select baud rate through which the console redirection is made. The following configuration options are available

- 115200 8,n,1 **DEFAULT**
- 57600 8,n,1
- 38400 8,n,1
- 19200 8,n,1
- 09600 8,n,1

Note:

Identical baud rate setting musts be set on the host (a management computer running a terminal software) and the slave

➔ **Flow Control [None]**

Use the **Flow Control** option to report the flow control method for the console redirection application.

| | | |
|---|---|---|
| ➔ **None** | **DEFAULT** | No control flow, |
| ➔ **Hardware** | | Hardware is set as the console redirection |
| ➔ **Software** | | Software is set as the console redirection |

➔ **Redirection After BIOS POST [Always]**

Use the **Redirection After BIOS POST** option to specify when console redirection should occur.

| | | |
|---|---|---|
| ➔ **Disabled** | | The console is not redirected after POST |
| ➔ **Boot Loader** | | Redirection is active during POST and during Boot Loader |
| ➔ **Always** | **DEFAULT** | Redirection is always active (Some OSes may not work if set to Always) |

➔ **Terminal Type [ANSI]**

Use the **Terminal Type** BIOS option to specify the remote terminal type.

| | | |
|---|---|---|
| ➔ **ANSI** | **DEFAULT** | The target terminal type is ANSI |

➔ **VT100** The target terminal type is VT100

➔ **VT-UTF8** The target terminal type is VT-UTF8

➔ **VT-UTF8 Combo Key Support [Disabled]**

Use the **VT-UFT8 Combo Key Support** option to enable additional keys that are not provided by VT100 for the PC 101 keyboard.

The VT100 Terminal Definition is the standard convention used to configure and conduct emergency management tasks with UNIX-based servers. VT100 does not support all keys on the standard PC 101-key layout, however. The VT-UTF8 convention makes available additional keys that are not provided by VT100 for the PC 101 keyboard.

➔ **Disabled** **DEFAULT** Disables the VT-UTF8 terminal keys

➔ **Enabled** Enables the VT-UTF8 combination key. Support for ANSI/VT100 terminals

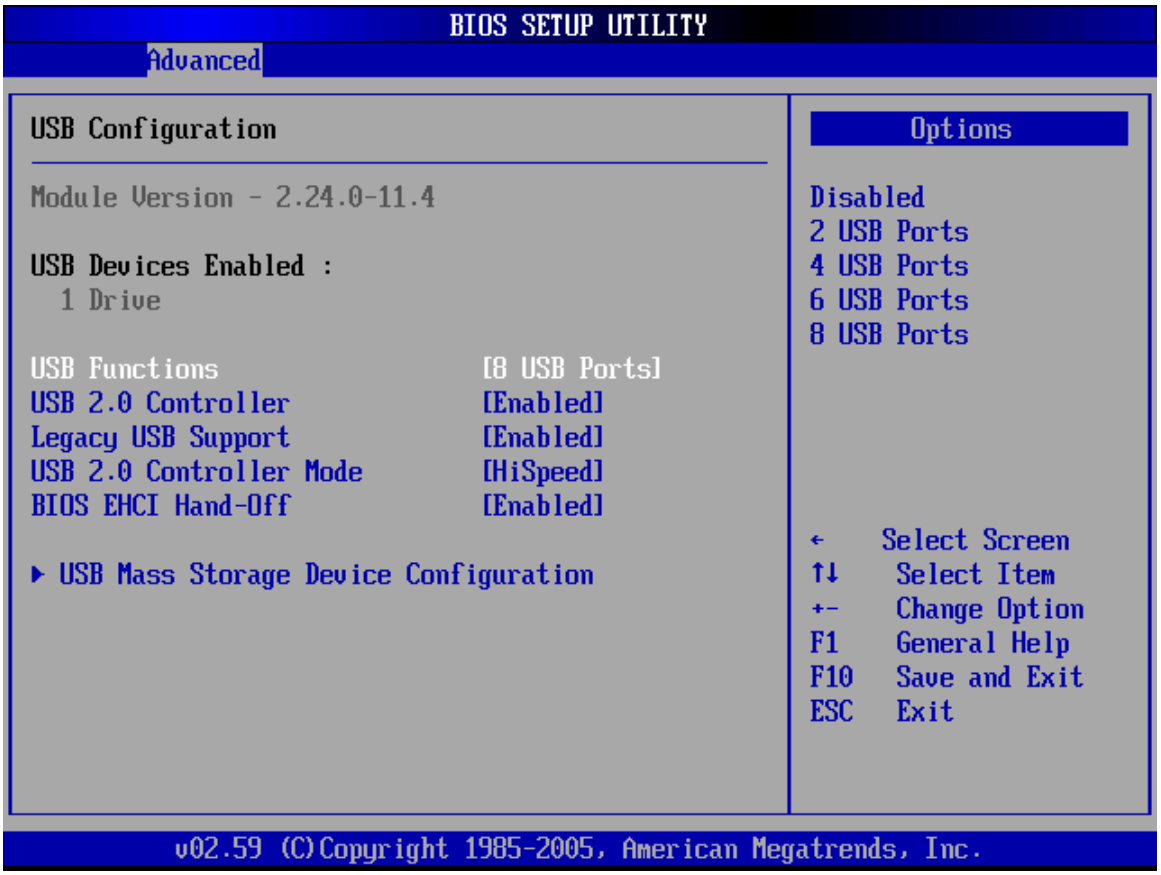
➔ **Sredir Memory Display Delay [Disabled]**

Use the **Sredir Memory Display Delay** option to select the delay before memory information is displayed. Configuration options are listed below

- No Delay **DEFAULT**
- Delay 1 sec
- Delay 2 sec
- Delay 4 sec

### 6.3.9 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 13**) to read USB configuration information and configure the USB settings.




**BIOS Menu 13: USB Configuration**

➔ **USB Function [8 USB ports]**

Use the **USB Function** BIOS option to enable or disable a specified number of USB ports. If only two USB ports are being used, disabling the remaining six USB frees up system resources that can be redirected elsewehere.

| | | |
|---|---|---|
| ➔ **Disabled** | | USB function support disabled |
| ➔ **2 USB Ports** | | Two USB ports are enabled |
| ➔ **4 USB Ports** | | Four USB ports are enabled |
| ➔ **6 USB Ports** | | Six USB ports are enabled |
| ➔ **8 USB Ports** | **DEFAULT** | Eight USB ports are enabled |

➔ **USB 2.0 Controller [Enabled]**

Use the **USB 2.0 Controller** BIOS option to enable or disable the USB 2.0 controller

| | | |
|---|---|---|
| ➔ **Disabled** | | USB 2.0 controller disabled |
| ➔ **Enabled** | **DEFAULT** | USB 2.0 controller enabled |

➔ **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support.

Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

| | | |
|---|---|---|
| ➔ **Disabled** | | Legacy USB support disabled |
| ➔ **Enabled** | **DEFAULT** | Legacy USB support enabled |
| ➔ **Auto** | | Legacy USB support disabled if no USB devices are connected |

➔ **USB 2.0 Controller Mode [HiSpeed]**

Use the **USB 2.0 Controller Mode** option to set the speed of the USB2.0 controller.

| | | |
|---|---|---|
| ➔ **FullSpeed** | | The controller is capable of operating at 12Mb/s |
| ➔ **HiSpeed** | **DEFAULT** | The controller is capable of operating at 480Mb/s |

➔ **BIOS EHCI Handoff**

Use the **BIOS EHCI Handoff** option for systems running OSes that do not have EHCI hand-off support. The EHCI ownership change is managed by the EHCI driver.

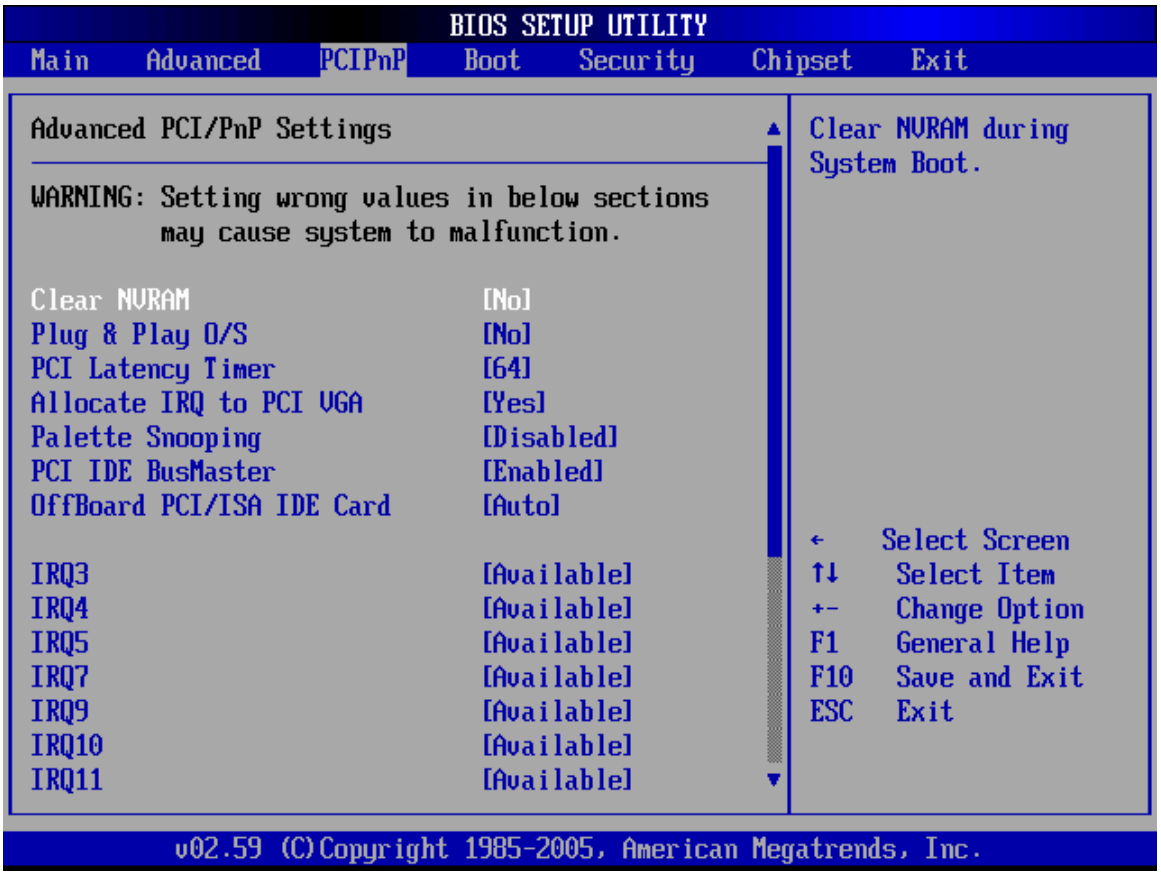
| | | |
|---|---|---|
| ➔ **Disabled** | | Systems with OSes that do not support EHCI can use the EHCI handoff functionality. |
| ➔ **Enabled** | **DEFAULT** | Systems with OSes that do not support EHCI cannot use the EHCI handoff functionality. |

## 6.4 PCI/PnP

Use the **PCI/PnP** menu (**BIOS Menu 13**) to configure advanced PCI and PnP settings.

WARNING:

Setting wrong values for the BIOS selections in the PCIPnP BIOS menu may cause the system to malfunction.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Advanced PCI/PnP Settings
WARNING: Setting wrong values in below sections
may cause system to malfunction.
Clear NVRAM [No]
Plug & Play O/S [No]
PCI Latency Timer [64]
Allocate IRQ to PCI VGA [Yes]
Palette Snooping [Disabled]
PCI IDE BusMaster [Enabled]
OffBoard PCI/ISA IDE Card [Auto]
IRQ3 [Available]
IRQ4 [Available]
IRQ5 [Available]
IRQ7 [Available]
IRQ9 [Available]
IRQ10 [Available]
IRQ11 [Available]
Clear NVRAM during System Boot.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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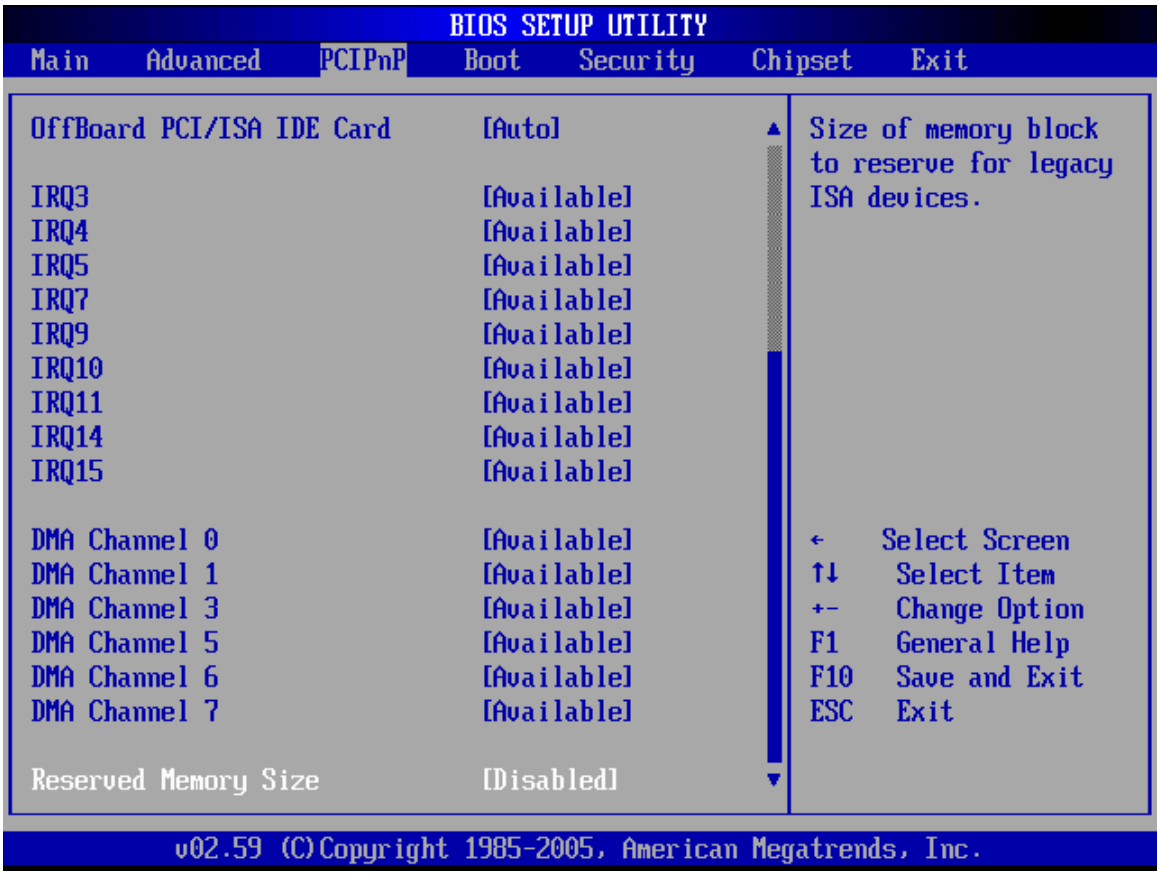



**BIOS Menu 14: PCI/PnP Configuration**

➔ **Clear NVRAM [No]**

Use the **Clear NVRAM** option to specify if the NVRAM (Non-Volatile RAM) is cleared when the power is turned off.

| | | |
|---|---|---|
| ➔ **No** | **DEFAULT** | System does not clear NVRAM during system boot |
| ➔ **Yes** | | System clears NVRAM during system boot |

➔ **Plug & Play O/S [No]**

Use the **Plug & Play O/S** BIOS option to specify whether system plug and play devices are configured by the operating system or the BIOS.

➔ **No** **DEFAULT** If the operating system does not meet the Plug and Play specifications, this option allows the BIOS to configure all the devices in the system.

➔ **Yes** This setting allows the operating system to change the interrupt, I/O, and DMA settings. Set this option if the system is running Plug and Play aware operating systems.

➔ **PCI Latency Timer [64]**

Use the **PCI Latency Timer** option to specify the PCI latency time. The latency time is measured in units of PCI clock cycles for the PCI device latency timer register. Configuration options are:

- 32
- 64 **DEFAULT**
- 96
- 128
- 160
- 192
- 224
- 248

➔ **Allocate IRQ to PCI VGA [Yes]**

Use the **Allocate IRQ to PCI VGA** option to restrict the system from giving the VGA adapter card an interrupt address.

➔ **Yes** (Default) Assigns an IRQ to a PCI VGA card if card requests IRQ

➔ **No** Does not assign IRQ to a PCI VGA card even if the card requests an IRQ

➔ **Palette Snooping [Disabled]**

Use the **Palette Snooping** option to enable or disable the palette snooping function.

➔ **Disabled** **DEFAULT** Unless the VGA card manufacturer requires palette snooping to be enabled, this option should be disabled.

➔ **Enabled** PCI devices are informed that an ISA based Graphics device is installed in the system so the ISA based Graphics card functions correctly. This does not necessarily indicate a physical ISA adapter card. The graphics chipset can be mounted on a PCI card. Always check with the adapter card manual first, before modifying the default settings in the BIOS.

➔ **PCI IDE BusMaster [Disabled]**

Use the **PCI IDE BusMaster** BIOS option to enable or prevent PCI IDE busmastering.

➔ **Disabled** **DEFAULT** Busmastering is prevented

➔ **Enabled** IDE controller on the PCI local bus has mastering capabilities

➔ **OffBoard PCI/ISA IDE Card [Auto]**

Use the OffBoard PCI/ISA IDE Card BIOS option to select the OffBoard PCI/ISA IDE Card.

➔ **Auto** **DEFAULT** The location of the Off Board PCI IDE adapter card is automatically detected by the AMIBIOS.

➔ **PCI Slot 1** PCI Slot 1 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 1.

➔ **PCI Slot 2** PCI Slot 2 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 2.

➔ **PCI Slot 3** PCI Slot 3 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 3.

➔ **PCI Slot 4** PCI Slot 4 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 4.

➔ **PCI Slot 5** PCI Slot 5 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 5.

➔ **PCI Slot 6** PCI Slot 6 is selected as the location of the OffBoard PCI IDE adapter card. Only select this slot if the adapter card is installed in PCI Slot 6.

➔ **IRQ# [Available]**

Use the **IRQ#** address to specify what IRQs can be assigned to a particular peripheral device.

➔ **Available** **DEFAULT** The specified IRQ is available to be used by PCI/PnP devices

➔ **Reserved** The specified IRQ is reserved for use by Legacy ISA devices

Available IRQ addresses are:

- IRQ3
- IRQ4
- IRQ5
- IRQ7
- IRQ9
- IRQ10

- IRQ 11
- IRQ 14
- IRQ 15

➔ **DMA Channel# [Available]**

Use the **DMA Channel#** option to assign a specific DMA channel to a particular PCI/PnP device.

| | | |
|---|---|---|
| ➔ **Available** | **DEFAULT** | The specified DMA is available to be used by PCI/PnP devices |
| ➔ **Reserved** | | The specified DMA is reserved for use by Legacy ISA devices |

Available DMA Channels are:

- DM Channel 0
- DM Channel 1
- DM Channel 3
- DM Channel 5
- DM Channel 6
- DM Channel 7

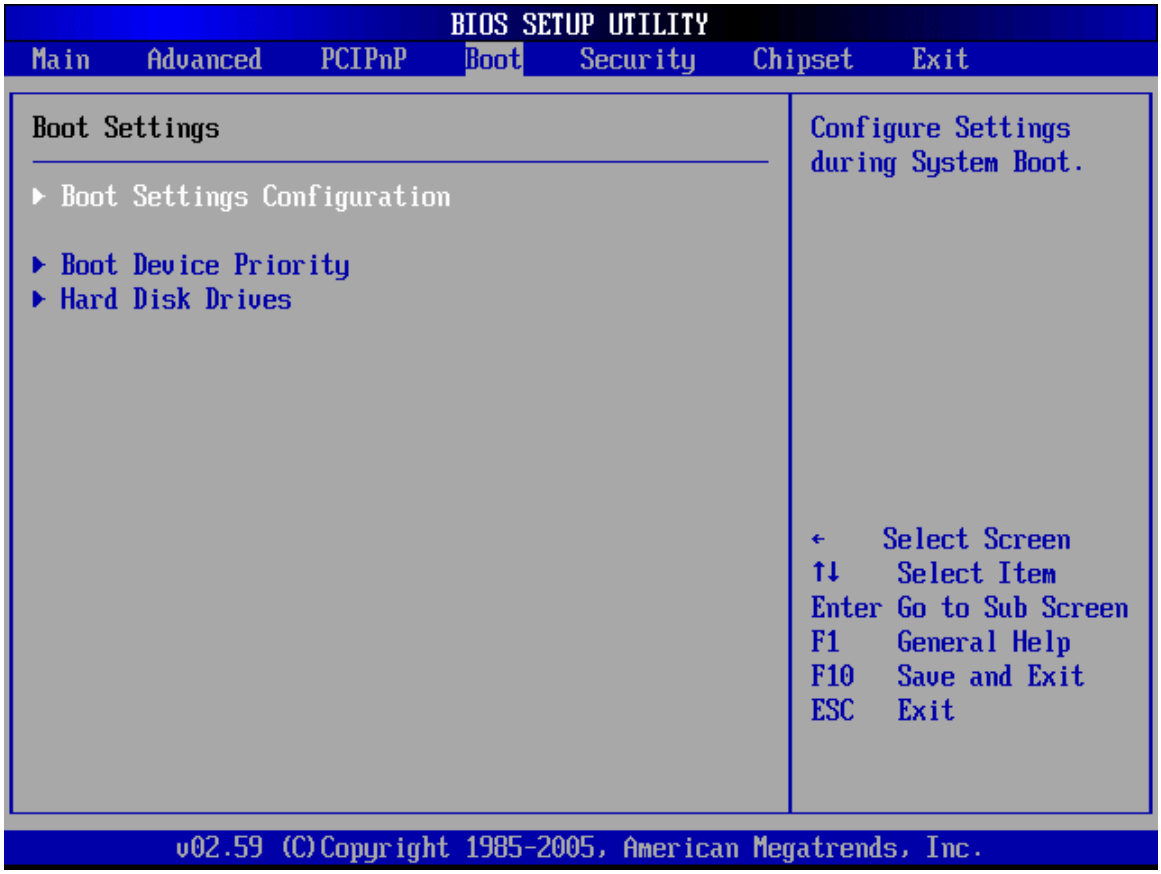
➔ **Reserved Memory Size [Disabled]**

Use the **Reserved Memory Size** BIOS option to specify the amount of memory that should be reserved for legacy ISA devices.

| | | |
|---|---|---|
| ➔ **Disabled** | **DEFAULT** | No memory block reserved for legacy ISA devices |
| ➔ **16K** | | 16KB reserved for legacy ISA devices |
| ➔ **32K** | | 32KB reserved for legacy ISA devices |
| ➔ **64K** | | 54KB reserved for legacy ISA devices |

## 6.5 Boot

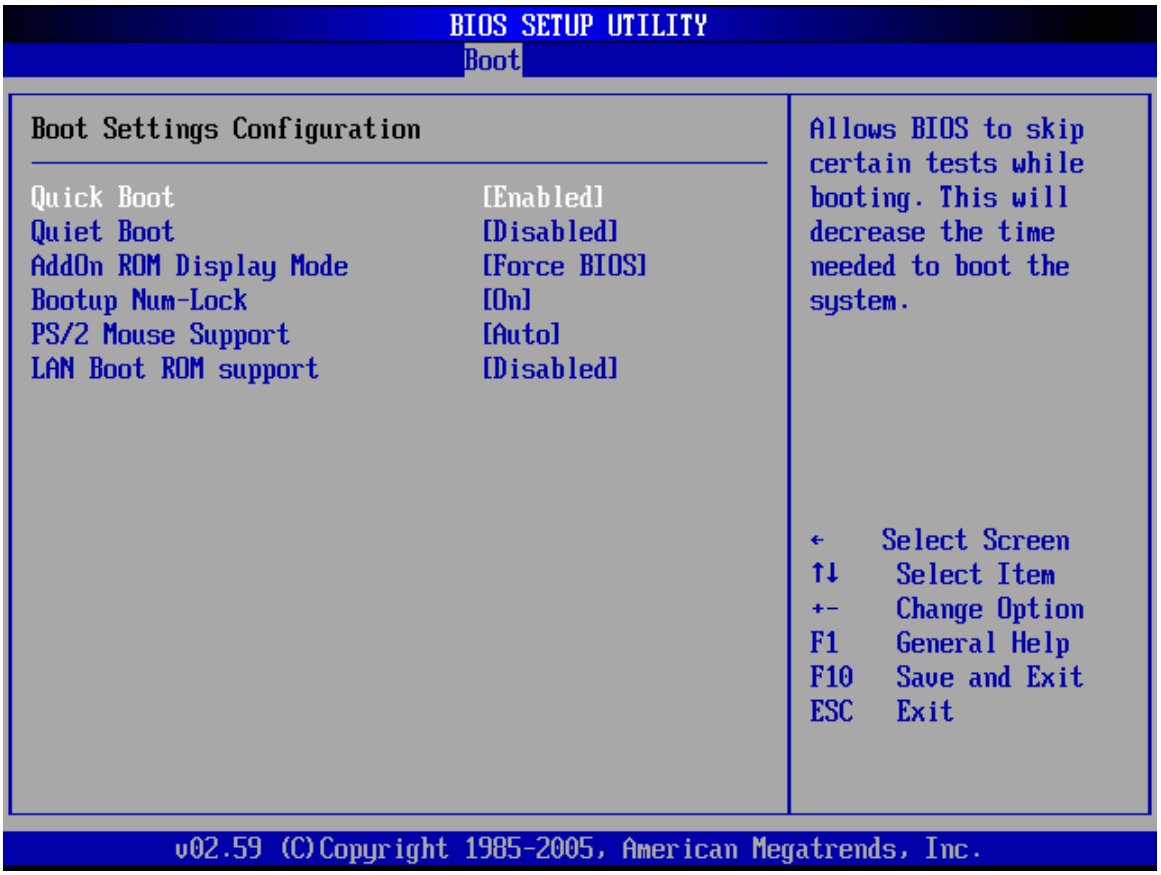
Use the Boot menu (BIOS Menu 15) to configure system boot options.




**BIOS Menu 15: Boot**

### 6.5.1 Boot Settings Configuration

Use the Boot Settings Configuration menu (BIOS Menu 15) to configure advanced system boot options.


BIOS SETUP UTILITY
Boot
Boot Settings Configuration
Quick Boot [Enabled]
Quiet Boot [Disabled]
AddOn ROM Display Mode [Force BIOS]
Bootup Num-Lock [On]
PS/2 Mouse Support [Auto]
LAN Boot ROM support [Disabled]
Allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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**BIOS Menu 16: Boot Settings Configuration**

➔ **Quick Boot [Enabled]**

Use the **Quick Boot** BIOS option to make the computer speed up the boot process.

| | | |
|---|---|---|
| ➔ **Disabled** | | No POST procedures are skipped |
| ➔ **Enabled** | **DEFAULT** | Some POST procedures are skipped to decrease the system boot time |

➔ **Quiet Boot [Disabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

| | | |
|---|---|---|
| ➔ **Disabled** | **DEFAULT** | Normal POST messages displayed |

➔ **Enabled** OEM Logo displayed instead of POST messages

➔ **AddOn ROM Display Mode [Force BIOS]**

Use the **AddOn ROM Display Mode** option to allow add-on ROM (read-only memory) messages to be displayed.

➔ **Force BIOS** **DEFAULT** The system forces third party BIOS to display during system boot.

➔ **Keep Current** The system displays normal information during system boot.

➔ **Bootup Num-Lock [On]**

Use the **Bootup Num-Lock** BIOS option to specify if the number lock setting must be modified during boot up.

➔ **Off** Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

➔ **On** **DEFAULT** Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

➔ **PS/2 Mouse Support [Enabled]**

Use the **PS/2 Mouse Support** option adjusts PS/2 mouse support capabilities.

➔ **Disabled** PS/2 mouse support is disabled and prevented from using system resources.

➔ **Enabled** **DEFAULT** Allows the system to use a PS/2 mouse.

➔ **Auto** The system auto-adjusts PS/2 mouse support.

➔ **LAN Boot ROM Support [Disabled]**

Use the **LAN Boot ROM Support** option to enable the system to be booted from a remote system.

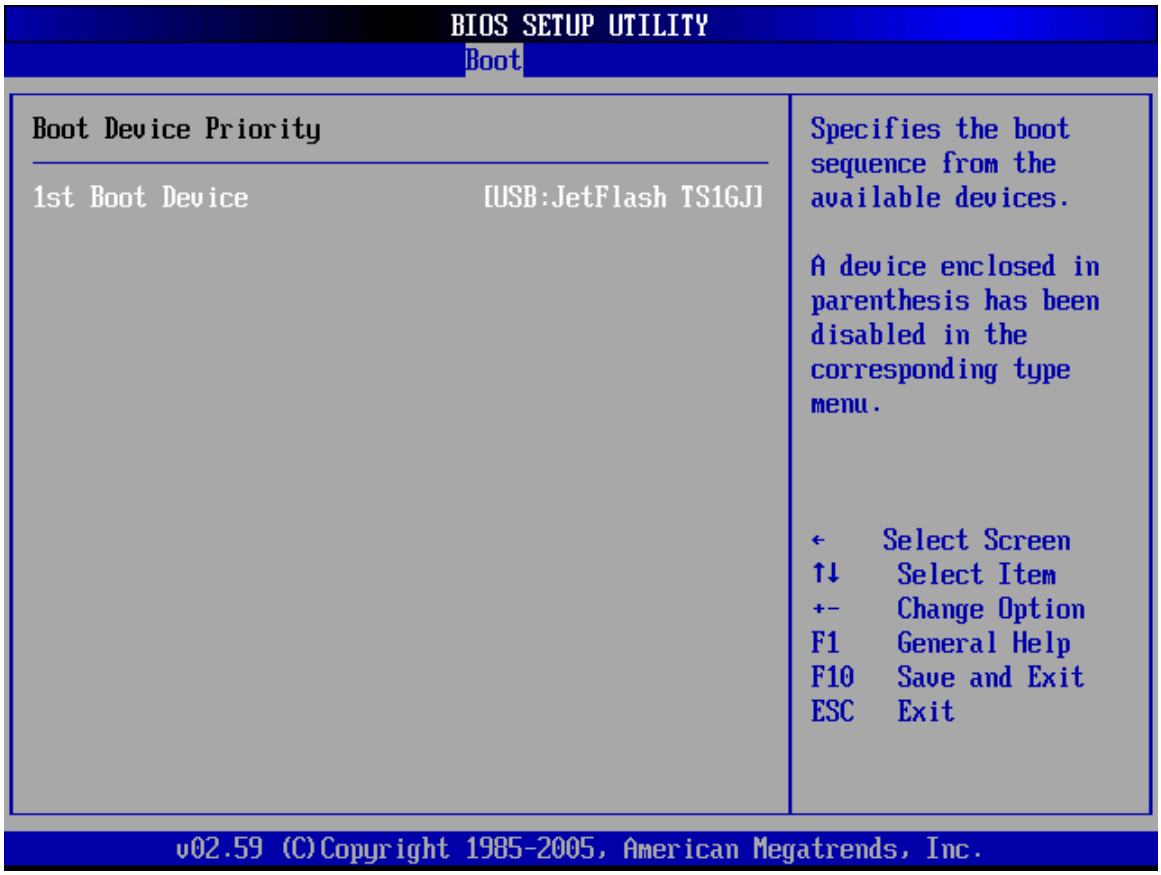
➔ **Disabled** (Default) Cannot be booted from a remote system through the LAN

➔ **Enabled** (Default) Can be booted from a remote system through the LAN

### 6.5.2 Boot Device Priority

Use the **Boot Device Priority** menu (**BIOS Menu 17**) to specify the boot sequence from the available devices. Possible boot devices may include:

- 1st FLOPPY DRIVE
- HDD
- CD/DVD


BIOS SETUP UTILITY
Boot
Boot Device Priority
1st Boot Device
[USB:JetFlash TS1GJ]
Specifies the boot sequence from the available devices.
A device enclosed in parenthesis has been disabled in the corresponding type menu.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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**BIOS Menu 17: Boot Device Priority Settings**

### 6.5.3 Hard Disk Drives

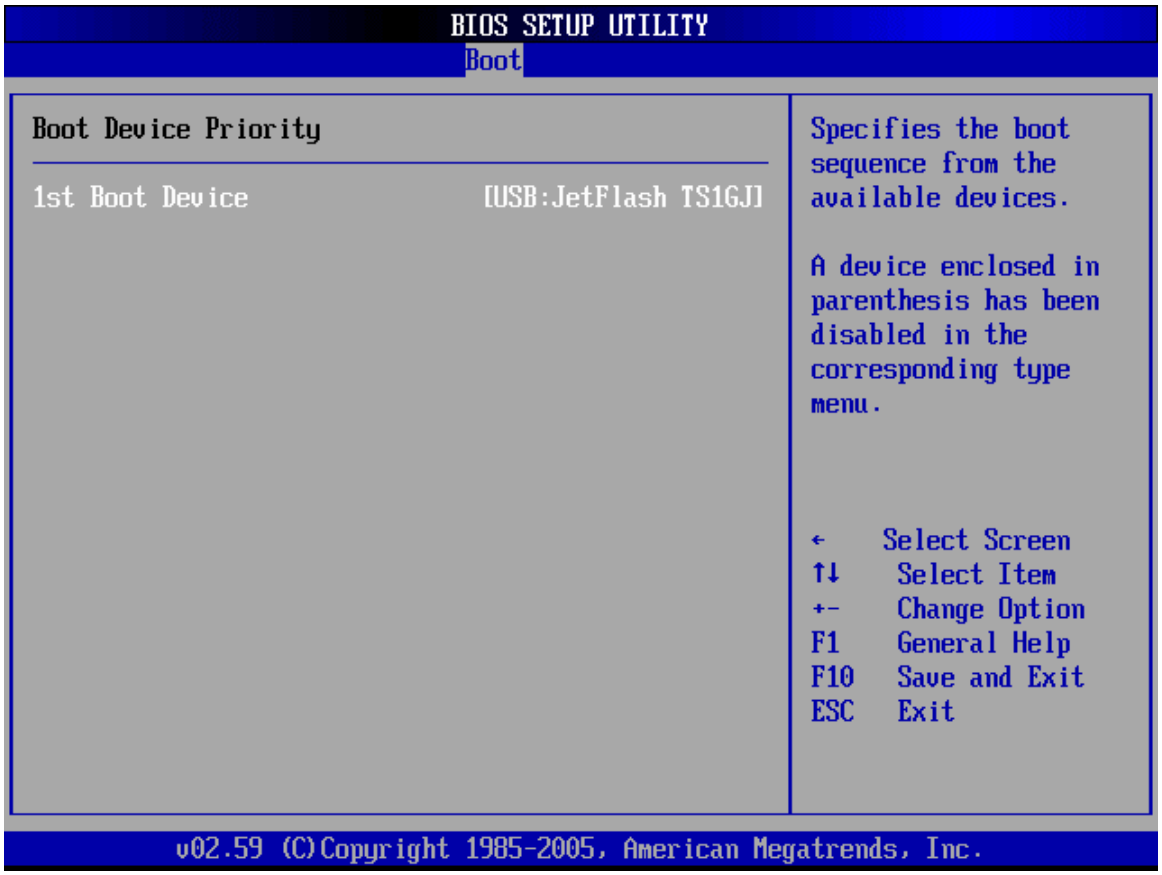
Use the **Hard Disk Drives** menu to specify the boot sequence of the available HDDs. When the menu is opened, the HDDs connected to the system are listed as shown below:

- 1st Drive [HDD: PM-(part number)]
- 2nd Drive [HDD: PS-(part number)]
- 3rd Drive [HDD: SM-(part number)]
- 4th Drive [HDD: SM-(part number)]

**NOTE:**

Only the drives connected to the system are shown. For example, if only two HDDs are connected only "**1st Drive**" and "**2nd Drive**" are listed.

The boot sequence from the available devices is selected. If the "**1st Drive**" option is selected a list of available HDDs is shown. Select the first HDD the system boots from. If the "**1st Drive**" is not used for booting this option may be disabled.


BIOS SETUP UTILITY
Boot
Boot Device Priority
1st Boot Device
[USB:JetFlash TS1GJ]
Specifies the boot sequence from the available devices.
A device enclosed in parenthesis has been disabled in the corresponding type menu.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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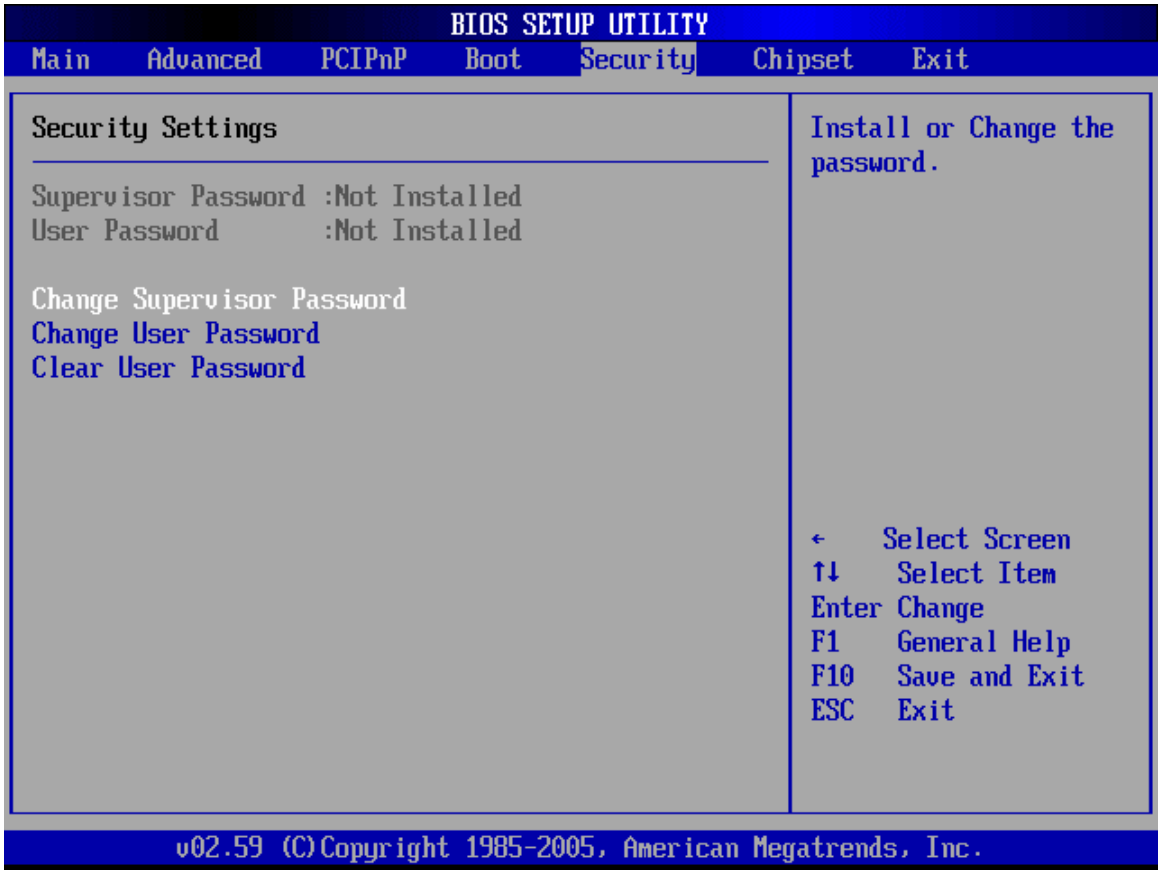
**BIOS Menu 18: Hard Disk Drives**

## 6.6 Security

Use the Security menu (BIOS Menu 19) to set system and user passwords.




**BIOS Menu 19: Security**

➔ **Change Supervisor Password**

Use the **Change Supervisor Password** to set or change a supervisor password. The default for this option is **Not Installed**. If a supervisor password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change Supervisor Password**.

➔ **Change User Password**

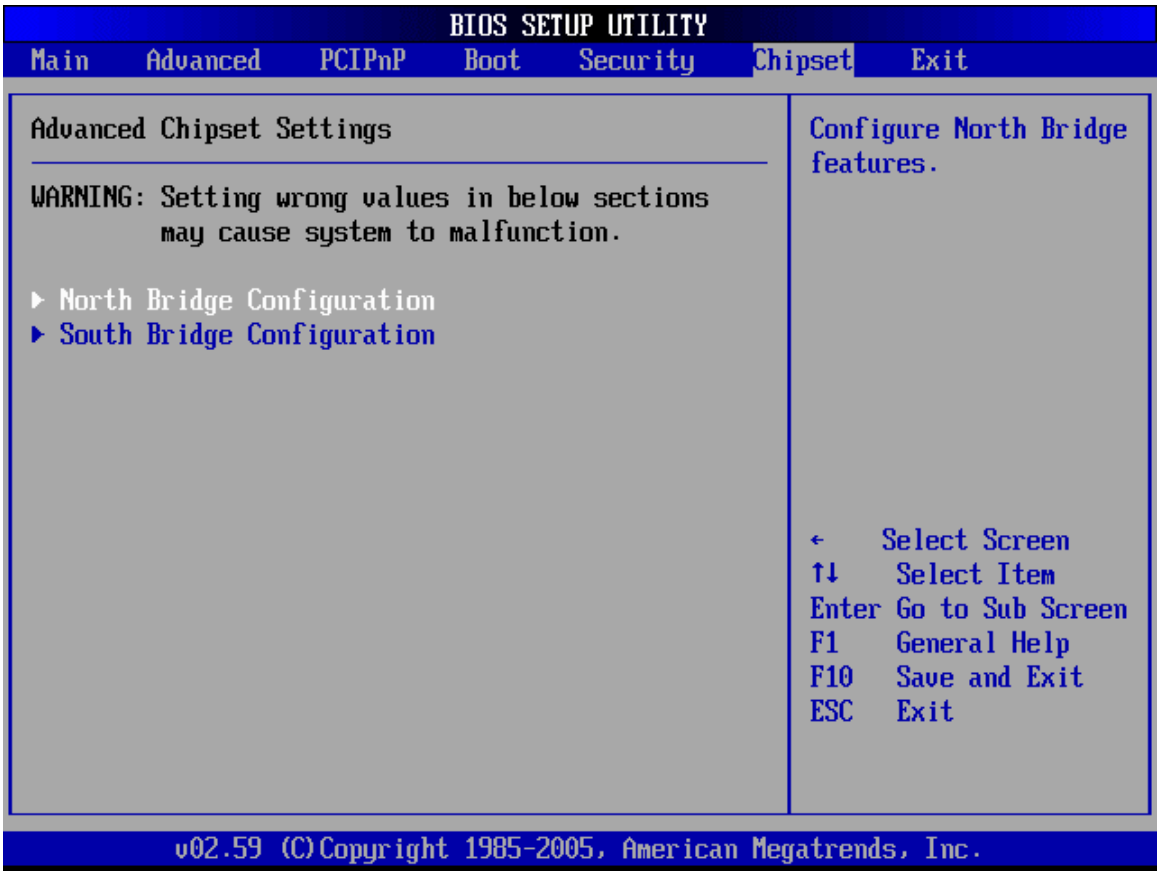
Use the **Change User Password** to set or change a user password. The default for this option is **Not Installed**. If a user password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change User Password**.

## 6.7 Chipset

Use the **Chipset** menu (**BIOS Menu 20**) to access the NorthBridge and SouthBridge configuration menus.

**WARNING:**

Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Advanced Chipset Settings
WARNING: Setting wrong values in below sections
may cause system to malfunction.
North Bridge Configuration
South Bridge Configuration
Configure North Bridge features.
← Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
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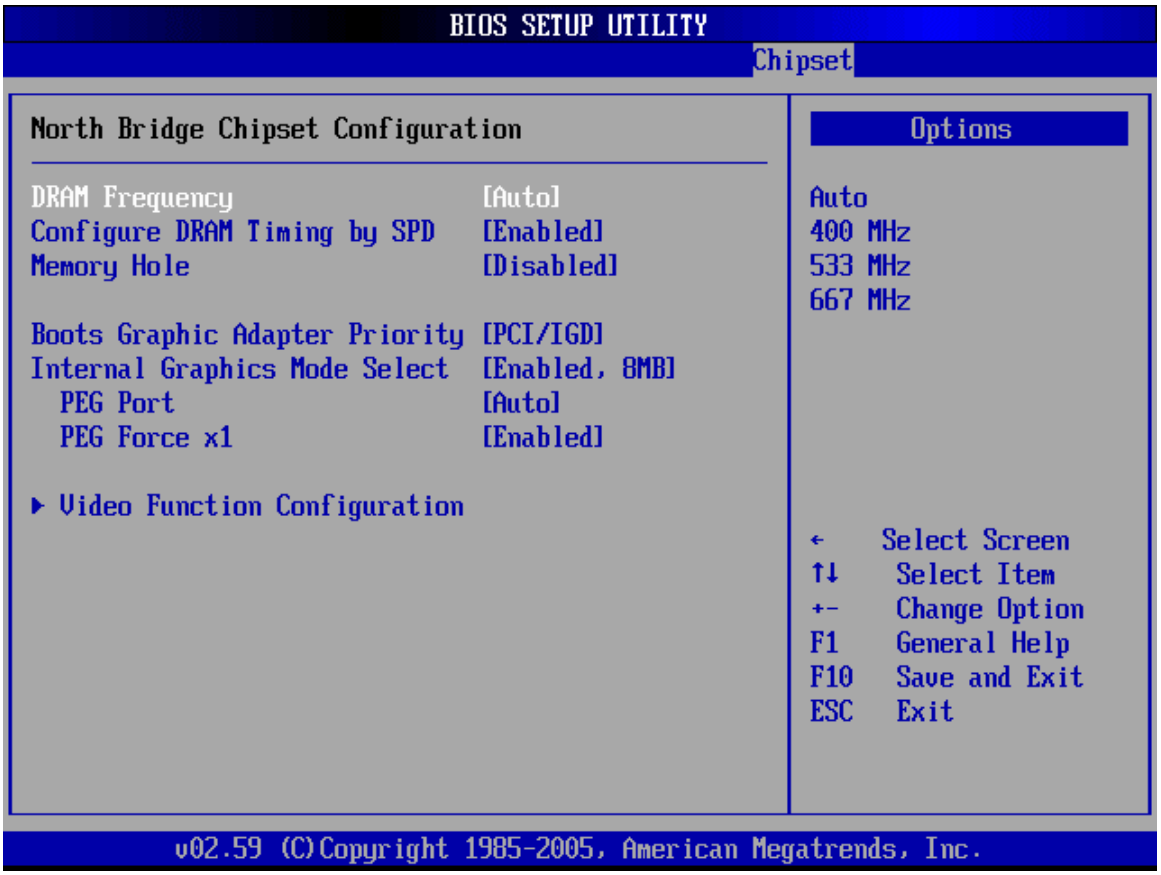
**BIOS Menu 20: Chipset**

### 6.7.1 NorthBridge Configuration

Use the NorthBridge Configuration menu (BIOS Menu 20) to configure the northbridge chipset.




**BIOS Menu 21:NorthBridge Chipset Configuration**

➔ **DRAM Frequency [Auto]**

Use the **DRAM Frequency** option to specify the DRAM frequency or allow the system to automatically detect the DRAM frequency.

| | | | |
|---|---|---|---|
| ➔ | **400MHz** | | Sets the DRAM frequency to 400MHz |
| ➔ | **533MHz** | | Sets the DRAM frequency to 533MHz |
| ➔ | **667MHz** | | Sets the DRAM frequency to 667MHz |
| ➔ | **Auto** | **DEFAULT** | Automatically selects the DRAM frequency |

➔ **Configure DRAM Timing by SPD [Enabled]**

Use the **Configure DRAM Timing by SPD** option to determine if the system uses the SPD *(*Serial Presence Detect) EEPROM to configure the DRAM timing. The SPD EEPROM contains all necessary DIMM specifications including the speed of the individual components such as CAS and bank cycle time as well as valid settings for the module and the manufacturer's code. The SPD enables the BIOS to read the spec sheet of the DIMMs on boot-up and then adjust the memory timing parameters accordingly.

| | | |
|---|---|---|
| ➔ **Disabled** | | DRAM timing parameters are manually set using the DRAM sub-items |
| ➔ **Enabled** | **DEFAULT** | DRAM timing parameter are set according to the DRAM Serial Presence Detect (SPD) |

If the **Configure DRAM Timing by SPD** option is disabled, the following configuration options appear.

- DRAM CAS# Latency [3]
- DRAM RAS# to CAS# Delay [5 DRAM Clocks]
- DRAM RAS# Precharge [5 DRAM Clocks]
- DRAM RAS# Activate to Precha [15 DRAM Clocks]

➔ **DRAM CAS# Latency [6**

Use the **CAS Latency Time** configuration option to set the Column Address Strobe (CAS) delay time. (To be able to change this configuration option the **DRAM Latency Timing** configuration option must be set to "**Manual**") The following configuration options are available

- 6 nanoseconds **DEFAULT**
- 5 nanoseconds
- 4 nanoseconds
- 3 nanoseconds

➔ **DRAM RAS# to CAS# Delay [6 DRAM Clocks]**

Use the **DRAM RAS# to CAS# Delay** option to specify the number of clock cycles must elapse between sending a RAS (row address strobe) signal and the CAS (column address strobe) signal. A pause is required between the RAS signal and the CAS signal to ensure the memory is correctly addressed. (To be able to change this configuration option the **Configure DRAM Timing by SPD** configuration option must be set to "**Disabled**") Configuration options are listed below:

- 2 DRAM Clocks
- 3 DRAM Clocks
- 4 DRAM Clocks
- 5 DRAM Clocks
- 6 DRAM Clocks **DEFAULT**

➔ **DRAM RAS# Precharge [3 DRAM Clocks]**

Use the **DRAM RAS# Precharge** option to set the speed at which the RAM terminates the access of one row and start accessing another. (To be able to change this configuration option the **DRAM RAS# Precharge** configuration option must be set to "**Manual**") The following configuration options are available

- 2 DRAM Clocks
- 3 DRAM Clocks
- 4 DRAM Clocks
- 5 DRAM Clocks
- 6 DRAM Clocks **DEFAULT**

➔ **DRAM RAS# Activate to Precha [15 DRAM Clocks]**

Use the **DRAM RAS# Activate to Precha** option to specify the length of the delay between the activation and precharge commands for the RAS signal. That is how long after activation can the access cycle be started again. This influences row activation time that is considered when memory has hit the last column in a specific row, or when an entirely different memory location is requested. (To be able to change this configuration

option the **Configure DRAM Timing by SPD** configuration option must be set to "**Disabled**") The following configuration options are available:

- 4 DRAM Clocks
- 5 DRAM Clocks
- 6 DRAM Clocks
- 7 DRAM Clocks
- 8 DRAM Clocks
- 9 DRAM Clocks
- 10 DRAM Clocks
- 11 DRAM Clocks
- 12 DRAM Clocks
- 13 DRAM Clocks
- 14 DRAM Clocks
- 15 DRAM Clocks **DEFAULT**

➔ **Memory Hole [Disabled]**

Use the **Memory Hole** option to reserve memory space between 15MB and 16MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

| | | |
|---|---|---|
| ➔ **Disabled** | **DEFAULT** | Memory is not reserved for ISA expansion cards |
| ➔ **15MB – 16MB** | | Between 15MB and 16MB of memory is reserved for ISA expansion cards |

➔ **Boots Graphics Adapter [PEG/PCI]**

Use the **Boots Graphics Adapter** option to select the graphics controller used as the primary boot device. Select either an integrated graphics controller (IGD) or a combination of PCI graphics controller, a PCI express (PEG) controller or an IGD. Configuration options are listed below:

- IGD
- PCI/IGD **DEFAULT**

➔ **Internal Graphics Mode Select [Enable, 8MB]**

Use the **Internal Graphic Mode Select** option to specify the amount of system memory that can be used by the Internal graphics device.

| | | |
|---|---|---|
| ➔ **Disable** | | |
| ➔ **Enable, 1MB** | | 1MB of memory used by internal graphics device |
| ➔ **Enable, 8MB** | **DEFAULT** | 8MB of memory used by internal graphics device |

➔ **PEG Port [Enabled]**

Use the **PEG Port** option to enable or disable the PCI Express port.

| | | |
|---|---|---|
| ➔ **Disabled** | | Installed PEG cards cannot function. |
| ➔ **Auto** | **DEFAULT** | PEG card is detected automatically and functions normally |

➔ **PEG Force X1 [Disabled]**

Use the **PEG Force x1** option to convert a PCI express X16 slot into a PCI express X1 slot.

| | | |
|---|---|---|
| ➔ **Disabled** | | PCI express X16 slot runs in normal mode |

➔ **Enabled** **DEFAULT** PCI express X16 slot runs in PCI express X1 mode

### 6.7.1.1 Video Function Configuration

Use the **Video Function Configuration** menu to configure the video device connected to the system.

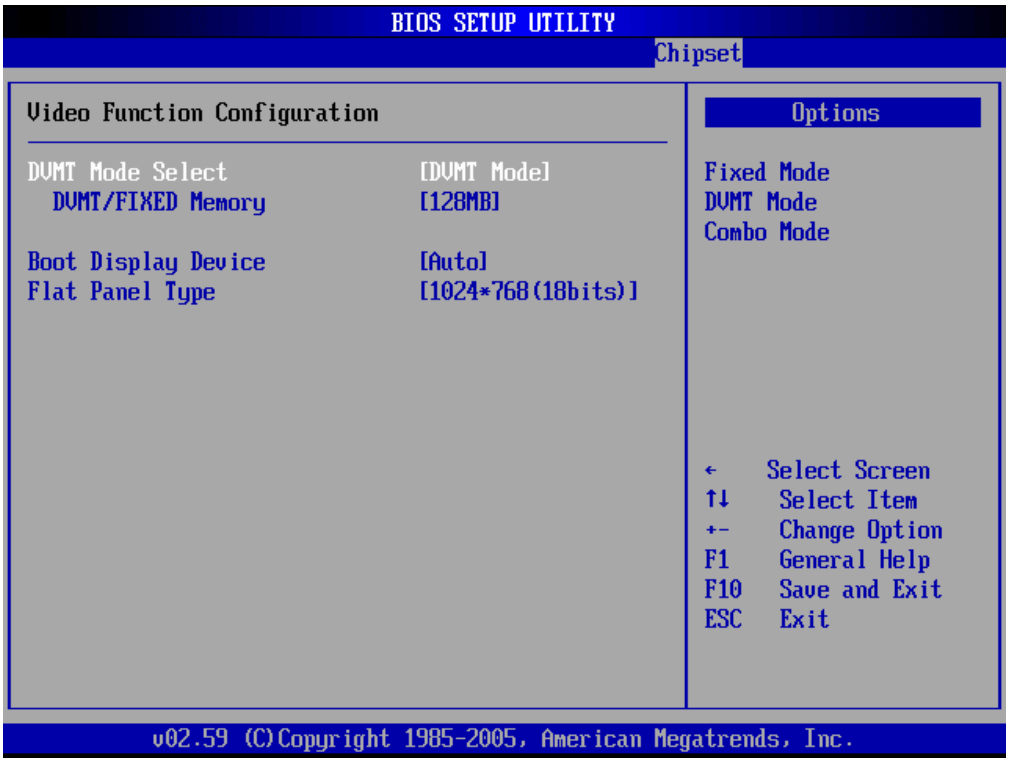



**Figure 6-1: Video Function Configuration**

➔ **DVMT Mode Select [DVMT Mode]**

Use the **DVMT Mode Select** option to select the Intel Dynamic Video Memory Technology (DVMT) operating mode.

➔ **Fixed Mode** A fixed portion of graphics memory is reserved as graphics memory.

➔ **DVMT Mode** **DEFAULT** Graphics memory is dynamically allocated according to the system and graphics needs.

➔ **Combo Mode** A fixed portion of graphics memory is reserved as graphics memory. If more memory is needed, graphics memory is dynamically allocated according to the system and graphics needs.

➔ **DVMT/FIXED Memory**

Use the **DVMT/FIXED Memory** option to specify the maximum amount of memory that can be allocated as graphics memory. This option can only be configured for if **DVMT Mode** or **Fixed Mode** is selected in the **DVMT Mode Selec**t option. If **Combo Mode** is selected, the maximum amount of graphics memory is 128MB. Configuration options are listed below.

- 64MB
- 128MB **DEFAULT**
- Maximum DVMT

➔ **Boot Display Device**

Use the **Boot Display Device** option to select the display device used by the system when it boots. Configuration options are listed below.

- Auto
- CRT **DEFAULT**
- TV
- LFP
- CRT + LFP

➔ **Flat Panel Type [640x480 18bit LVDS]**

The **Flat Panel Type** BIOS option specifies the flat panel PC type being used.

**NOTE:**

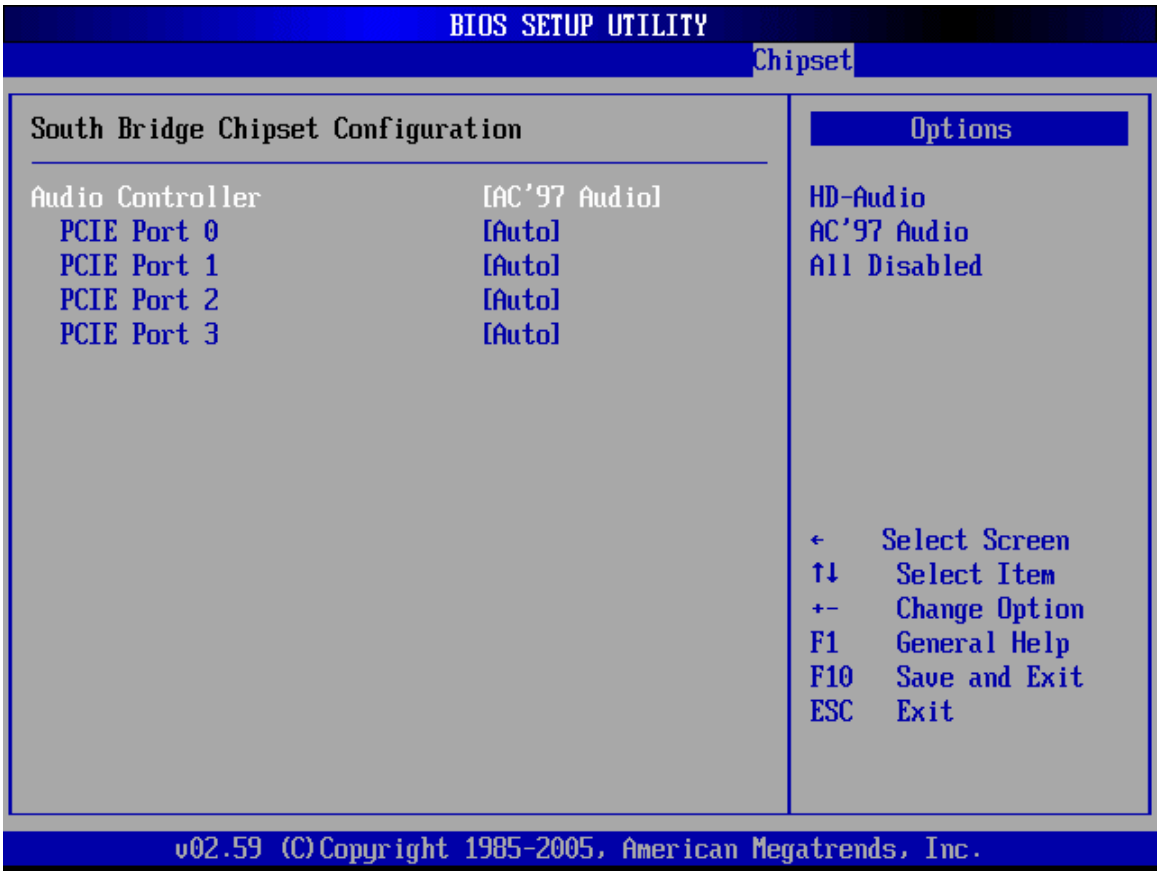
Please refer to the technical documents that came with the flat panel PC to ensure the correct settings are selected.

The following options are available:

- 640x480 18bits
- 800x600 18bits
- 1024x768 18bits
- 1280x1024 36bits
- 1400x1050 36bits
- 1600x1200 36bits
- 1024x768 48bits
- 1440*900 36bits
- 1440*900 48bits

### 6.7.2 SouthBridge Chipset Configuration

The SouthBridge Chipset Configuration menu (BIOS Menu 22) the southbridge chipset to be configured.




**BIOS Menu 22:SouthBridge Chipset Configuration**

➔ **Audio Controller [AC`97 Audio]**

The **Audio Controller** option allows selection of the audio controller to use.

| | | |
|---|---|---|
| ➔ **HD Audio** | | The Intel® High Definition Audio controller is enabled |
| ➔ **AC`97 Audio** | DEFAULT | The on-board AC'97 controller is enabled |
| ➔ **All Disabled** | | All audio controllers are disabled |

➔ **PCIE Port n [Enabled]**

Use the **PCIE Port n** option to determine enable or disable the nth PCIe port.

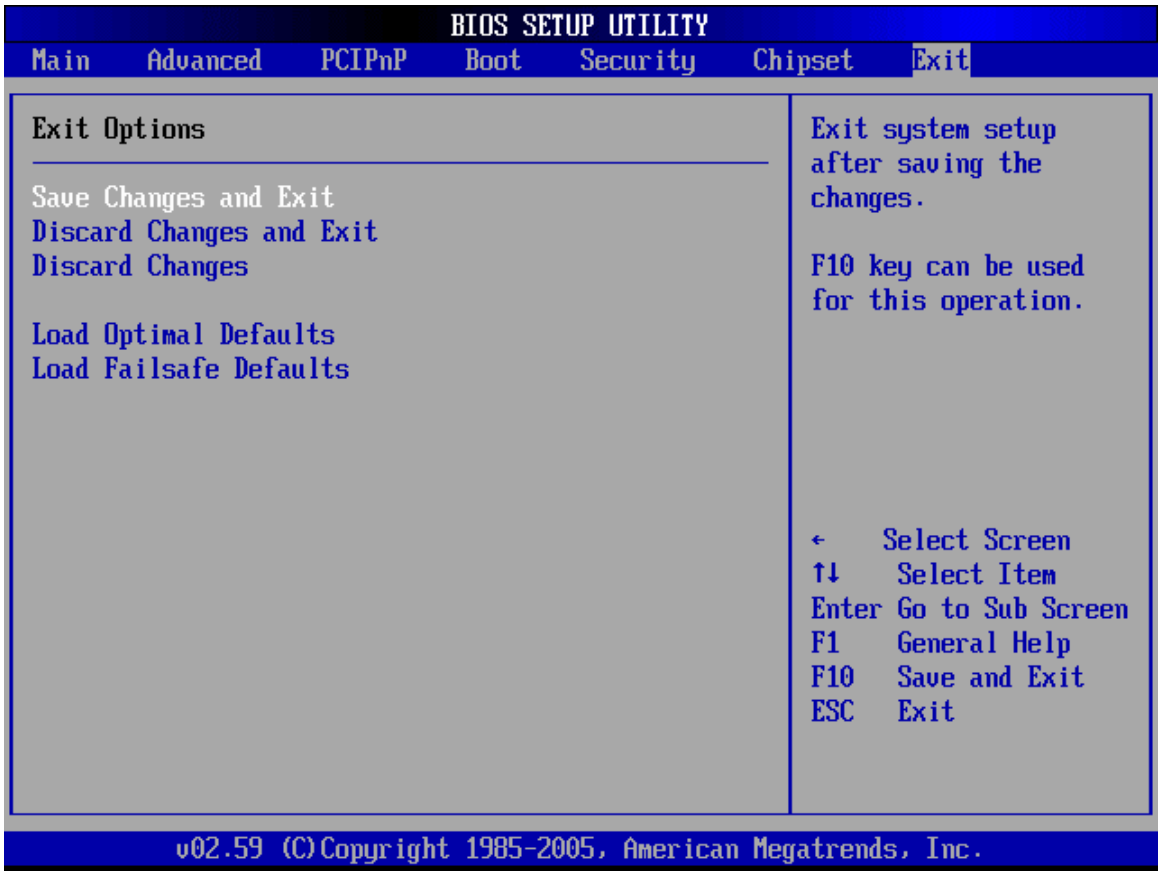
| | | |
|---|---|---|
| ➔ **Auto** | **DEFAULT** | nth PCI Express port is detected automatically |

➔ **Disabled** nth PCI Express port disabled.

➔ **Enabled** nth PCI Express port enabled.

## 6.8 Exit

Use the **Exit** menu (**BIOS Menu 23**) to load default BIOS values, optimal failsafe values and to save configuration changes.


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Exit
Exit Options
Save Changes and Exit
Discard Changes and Exit
Discard Changes
Load Optimal Defaults
Load Failsafe Defaults
Exit system setup after saving the changes.
F10 key can be used for this operation.
← Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
v02.59 (C)Copyright 1985-2005, American Megatrends, Inc.

**BIOS Menu 23:Exit**

➔ **Save Changes and Exit**

Use the **Save Changes and Exit** option to save the changes made to the BIOS options and to exit the BIOS configuration setup program.

➔ **Discard Changes and Exit**

Use the **Discard Changes and Exit** option to exit the BIOS configuration setup program without saving the changes made to the system.

➔ **Discard Changes**

Use the **Discard Changes** option to discard the changes and remain in the BIOS configuration setup program.

➔ **Load Optimal Defaults**

Use the **Load Optimal Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F9 key can be used for this operation.**

➔ **Load Failsafe Defaults**

Use the Load Failsafe Defaults option to load failsafe default values for each of the parameters on the Setup menus. F8 key can be used for this operation.

Chapter

7

# Driver Installation

## 7.1 Available Software Drivers

Note:

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. You may visit the IEI website or contact technical support for the latest updates.

The following drivers can be installed on the system.

- Chipset driver
- VGA driver
- LAN driver

Installation instructions are given below.

## 7.2 Driver CD Auto-run

All the drivers for the PICOe-9452 are on the CD that came with the system. To install the drivers, please follow the steps below.

**Step 1:** Insert the CD into a CD drive connected to the system.

**Step 2:** The starts up automatically

**Step 3:** Select PICOe-9452 from the initial menu shown in **Figure 7-1**.

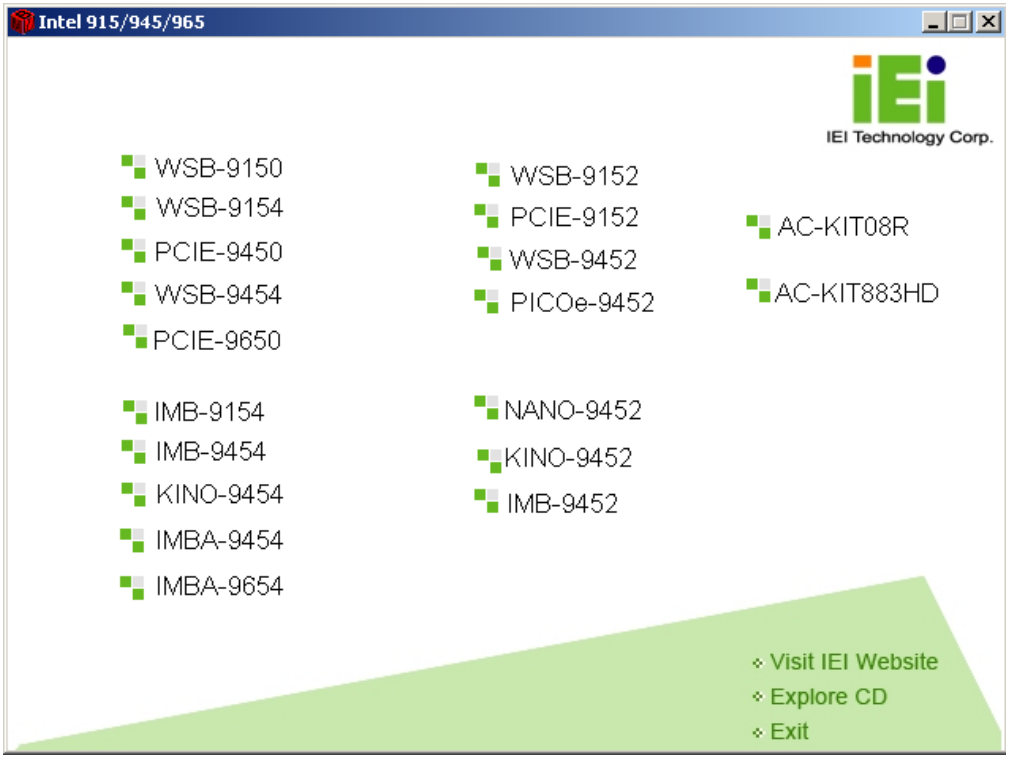



**Figure 7-1: Introduction Screen**

**Step 4:** A new screen with a list of available drivers appears (**Figure 7-2**).

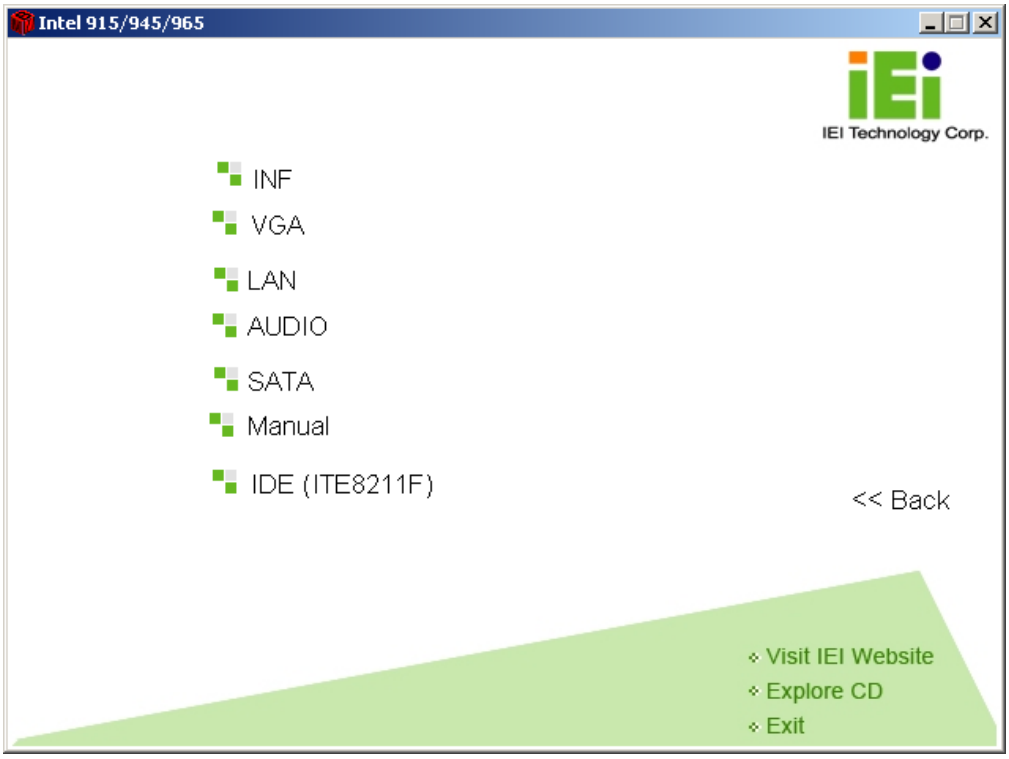



**Figure 7-2: Available Drivers**

**Step 5:** Select the driver to install from the list in **Figure 7-2**.

## 7.3 Chipset Driver Installation

To install the chipset driver, please follow the steps below:

**Step 1:** Select the INF driver from the list in **Figure 7-2**.

**Step 2:** A new window opens (**Figure 7-3**).

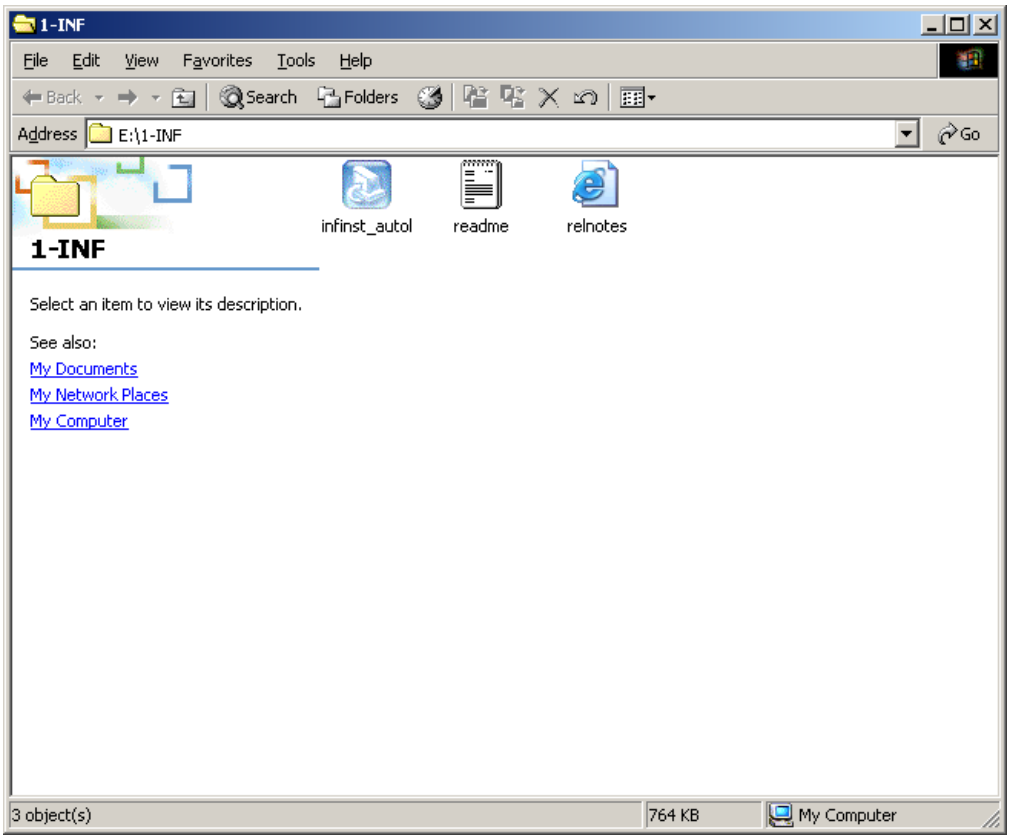



**Figure 7-3: Chipset Driver Installation Program**

**Step 3:** Double click the infinst_Autol icon in **Figure 7-3**.

**Step 4:** The welcome screen in **Figure 7-4** appears.

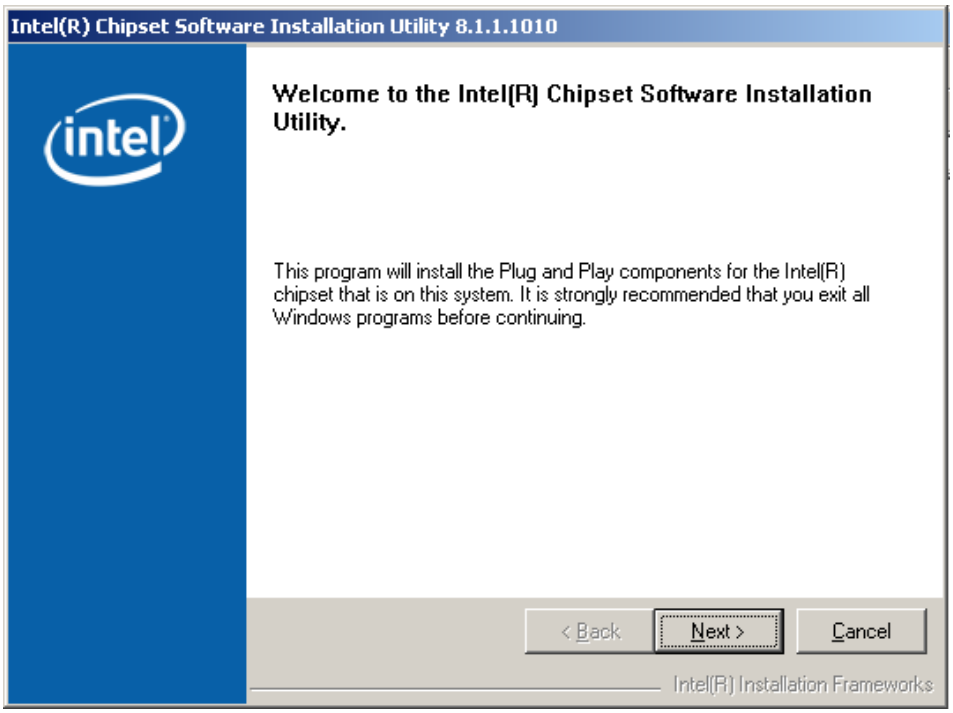

Intel(R) Chipset Software Installation Utility 8.1.1.1010
Welcome to the Intel(R) Chipset Software Installation Utility.
This program will install the Plug and Play components for the Intel(R) chipset that is on this system. It is strongly recommended that you exit all Windows programs before continuing.
< Back
Next >
Cancel
Intel(R) Installation Frameworks

**Figure 7-4: Chipset Driver Installation Welcome Screen**

**Step 5:** Click **NEXT** in **Figure 7-4** to continue the installation process.

**Step 6:** The license agreement in **Figure 7-5** appears.

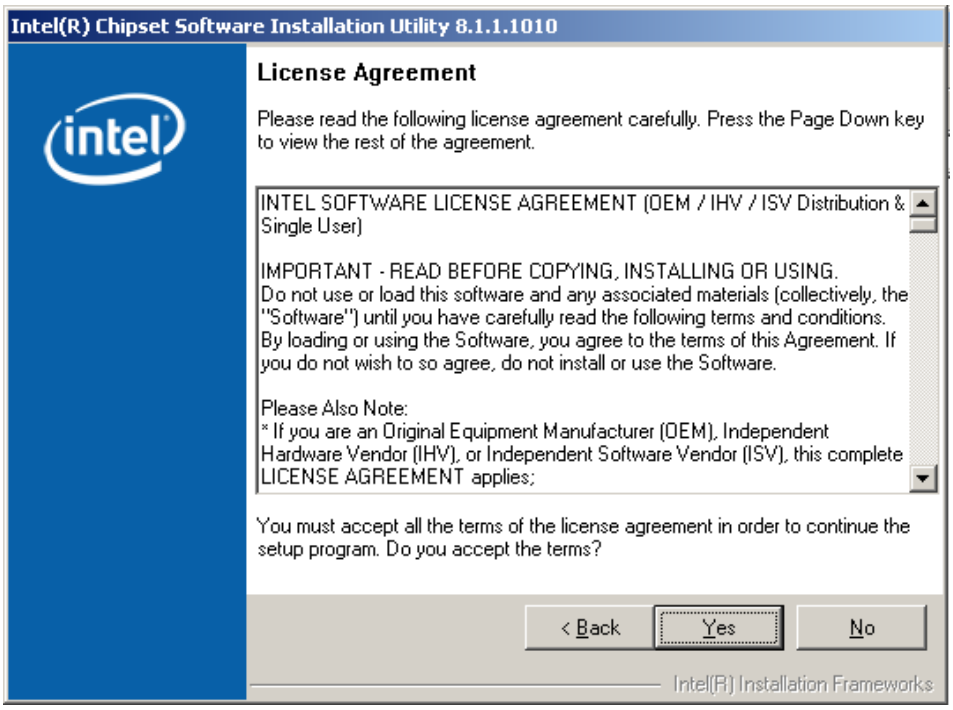

Intel(R) Chipset Software Installation Utility 8.1.1.1010
License Agreement
Please read the following license agreement carefully. Press the Page Down key to view the rest of the agreement.
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;
You must accept all the terms of the license agreement in order to continue the setup program. Do you accept the terms?
< Back
Yes
No
Intel(R) Installation Frameworks

**Figure 7-5: Chipset Driver Installation License Agreement**

**Step 7:** Click **YES** to continue the setup.

**Step 8:** The Readme file in **Figure 7-6** appears.

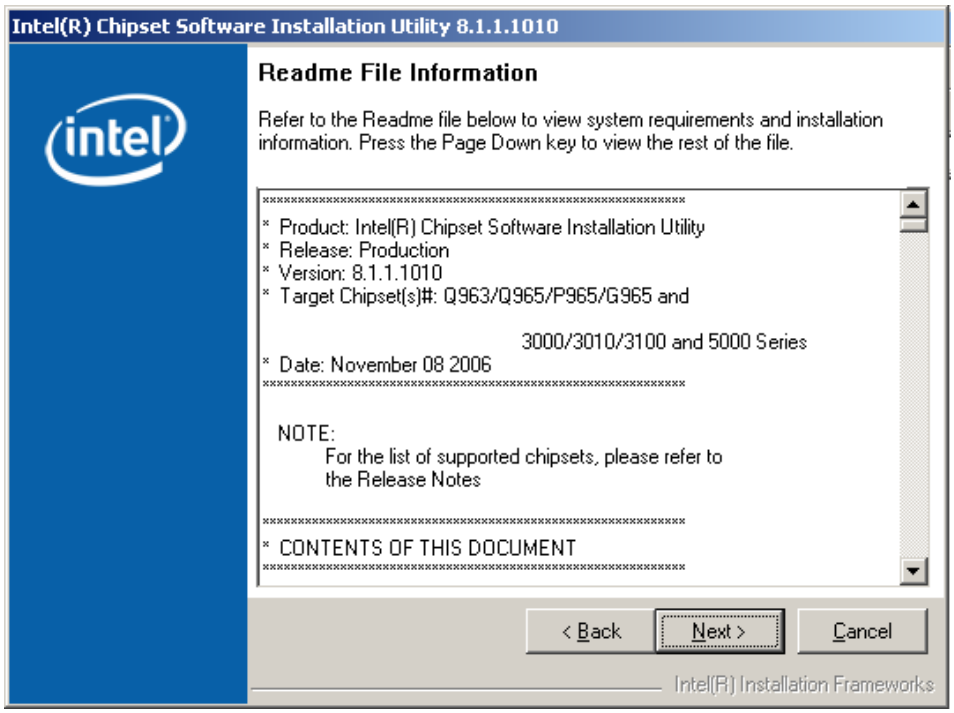

Intel(R) Chipset Software Installation Utility 8.1.1.1010
Readme File Information
Refer to the Readme file below to view system requirements and installation information. Press the Page Down key to view the rest of the file.
* Product: Intel(R) Chipset Software Installation Utility
* Release: Production
* Version: 8.1.1.1010
* Target Chipset(s)#: Q963/Q965/P965/G965 and
3000/3010/3100 and 5000 Series
* Date: November 08 2006
NOTE:
For the list of supported chipsets, please refer to the Release Notes
* CONTENTS OF THIS DOCUMENT
< Back
Next >
Cancel
Intel(R) Installation Frameworks

**Figure 7-6: Chipset Driver Readme File Information**

**Step 9:** Click **NEXT** in **Figure 7-6** to start the driver installation.

**Step 10:** After the driver installation process is complete, a confirmation screen (**Figure 7-7)** appears.

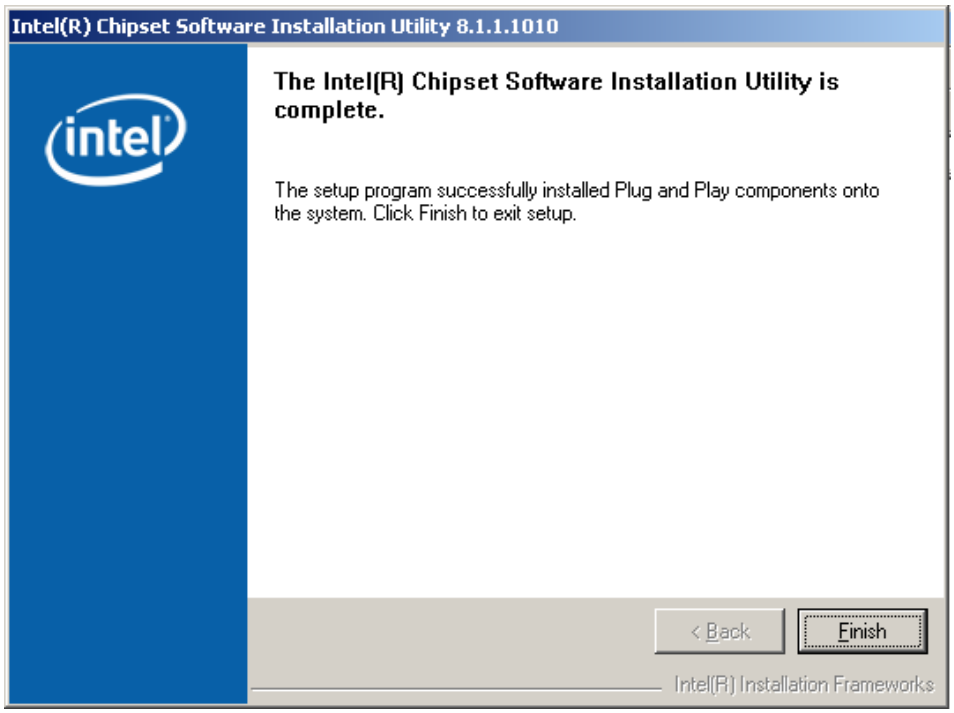

Intel(R) Chipset Software Installation Utility 8.1.1.1010
The Intel(R) Chipset Software Installation Utility is complete.
The setup program successfully installed Plug and Play components onto the system. Click Finish to exit setup.
< Back
Finish
Intel(R) Installation Frameworks

**Figure 7-7: Chipset Driver Installation Complete**

## 7.4 Intel Graphics Media Accelerator Driver

To install the chipset driver, please follow the steps below:

**Step 1:** Select the VGA driver from the list in **Figure 7-2**.

**Step 2:** A new window opens (**Figure 7-8**).

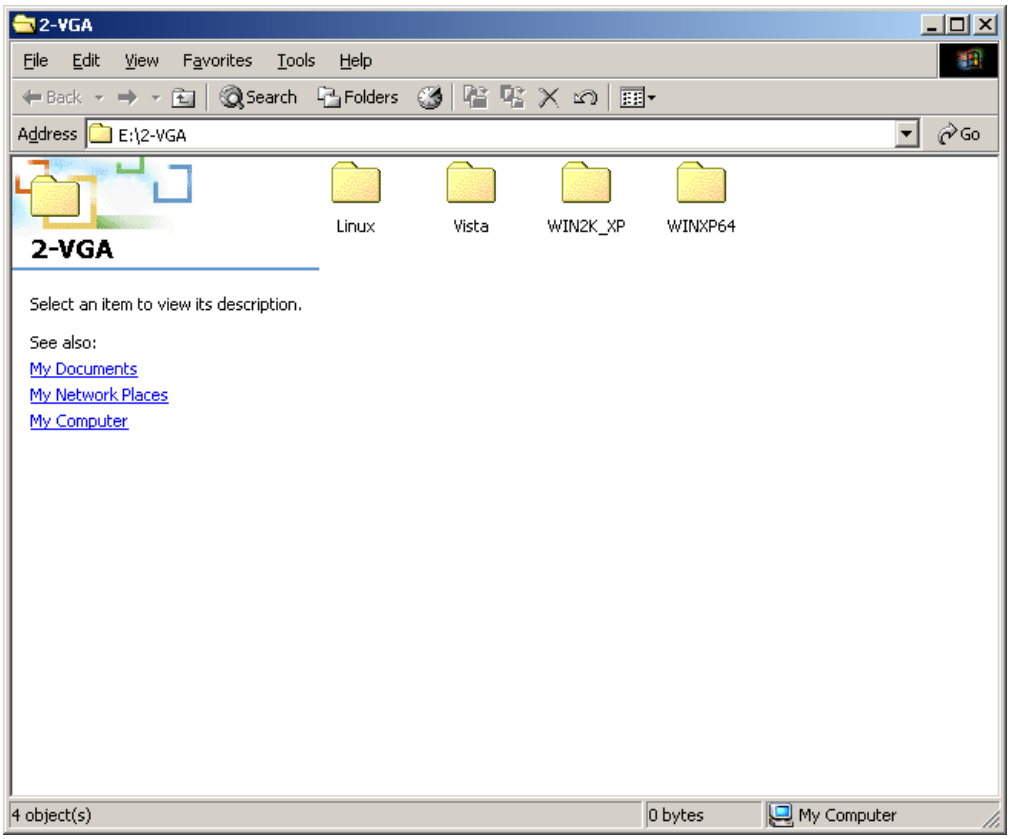



**Figure 7-8: Select the Operating System**

**Step 3:** Select the operating system from those shown in **Figure 7-8**.

**Step 4:** A new window appears (**Figure 7-9**).

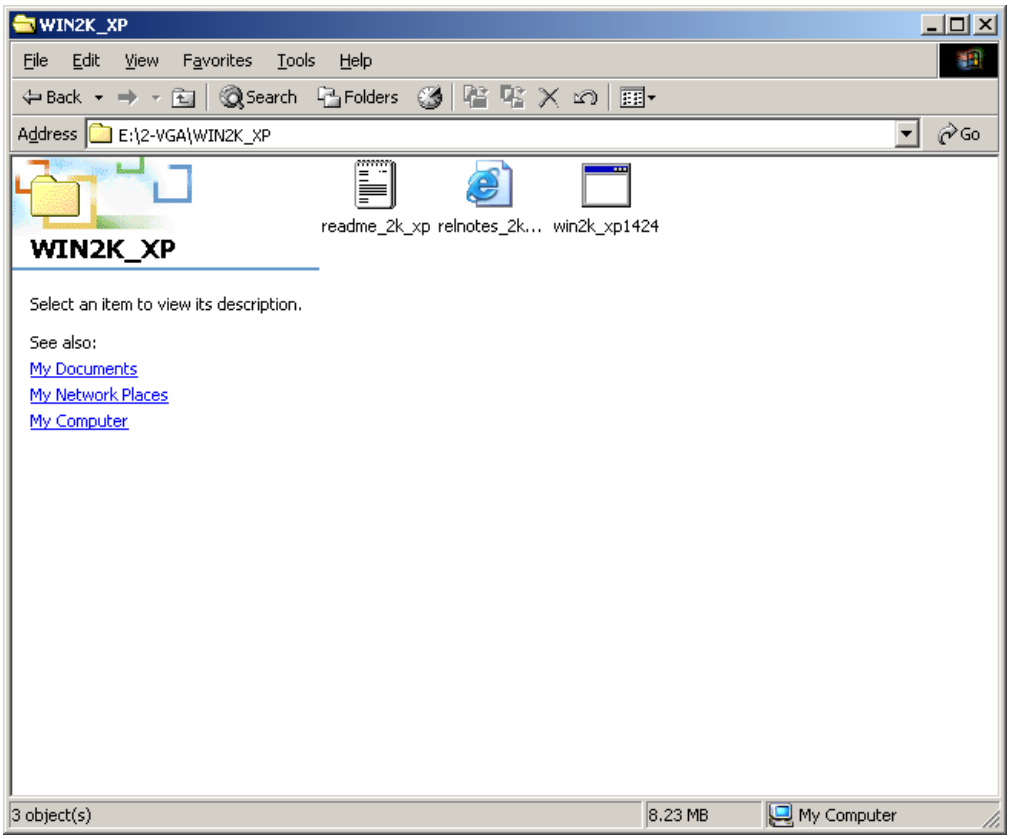



**Figure 7-9: VGA Driver**

**Step 5:** Click the installation program icon in **Figure 7-9**.

**Step 6:** The Readme information file shown in **Figure 7-10** appears.

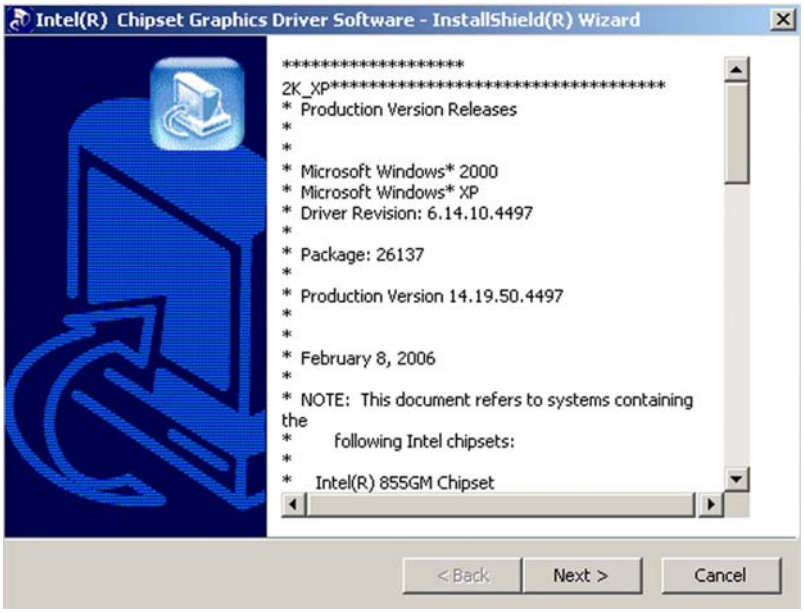



**Figure 7-10: GMA Driver Readme File**

**Step 7:** Click **NEXT** to extract the GMA driver files. See **Figure 7-11**.

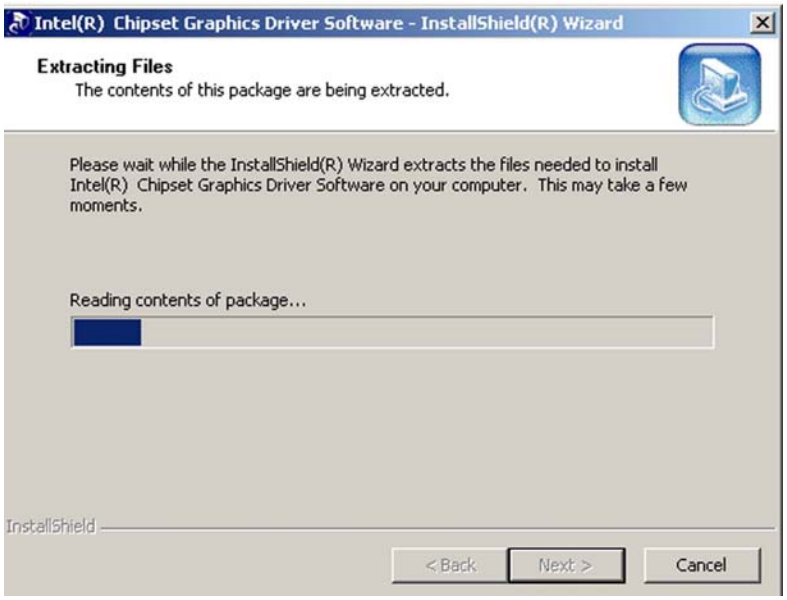

Intel(R) Chipset Graphics Driver Software - InstallShield(R) Wizard
Extracting Files
The contents of this package are being extracted.
Please wait while the InstallShield(R) Wizard extracts the files needed to install Intel(R) Chipset Graphics Driver Software on your computer. This may take a few moments.
Reading contents of package...
InstallShield
< Back
Next >
Cancel

**Figure 7-11: GMA Driver File Extraction**

**Step 8:** The welcome screen shown in **Figure 7-12** appears.

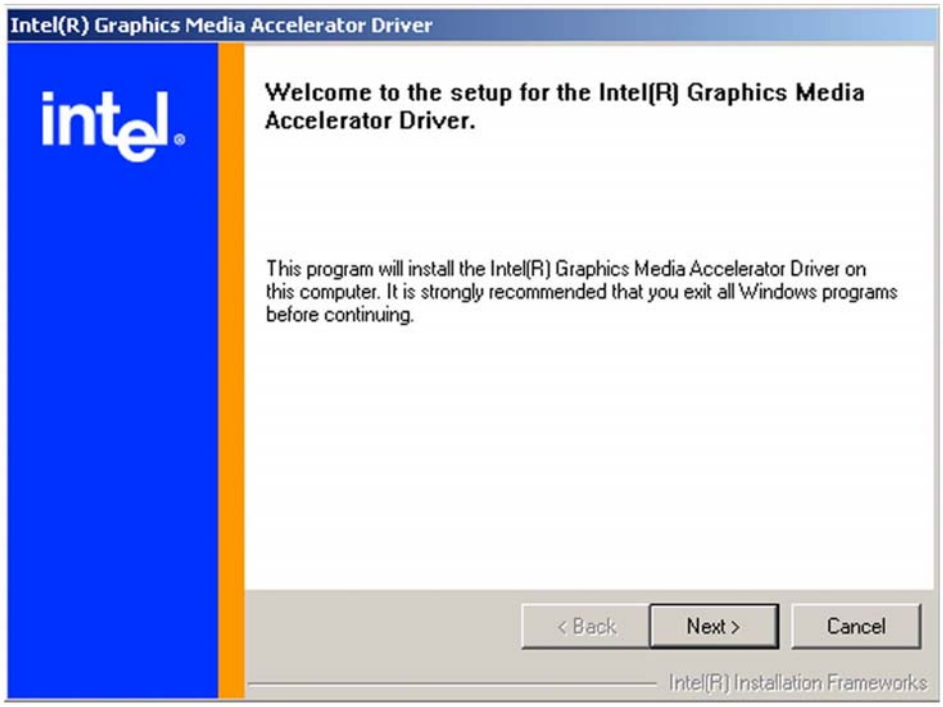

Intel(R) Graphics Media Accelerator Driver
intel
Welcome to the setup for the Intel(R) Graphics Media Accelerator Driver.
This program will install the Intel(R) Graphics Media Accelerator Driver on this computer. It is strongly recommended that you exit all Windows programs before continuing.
< Back
Next >
Cancel
Intel(R) Installation Frameworks

**Figure 7-12: GMA Driver Installation Welcome Screen**

**Step 9:** To continue the installation process, click **NEXT**.

**Step 10:** The license agreement in **Figure 7-13** appears.

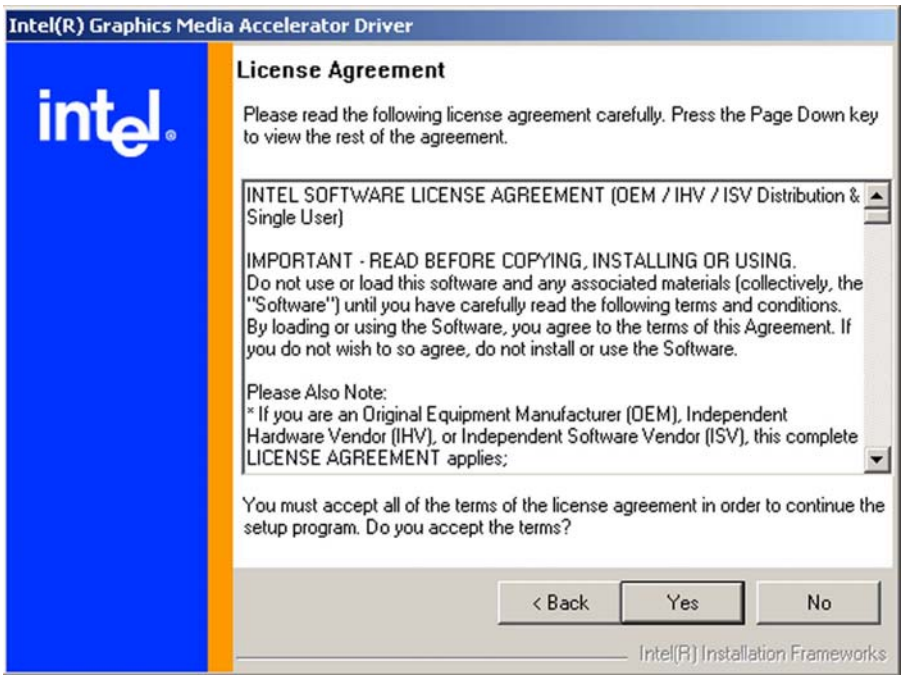

Intel(R) Graphics Media Accelerator Driver
intel
License Agreement
Please read the following license agreement carefully. Press the Page Down key to view the rest of the agreement.
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;
You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms?
< Back
Yes
No
Intel(R) Installation Frameworks

**Figure 7-13: GMA Driver License Agreement**

**Step 11:** Click the **YES** in **Figure 7-13** to continue.

**Step 12:** The installation notice shown in **Figure 7-14** appears.

**Figure 7-14: GMA Driver Installing Notice**

**Step 13:** A confirmation screen shown in **Figure 7-15** appears.

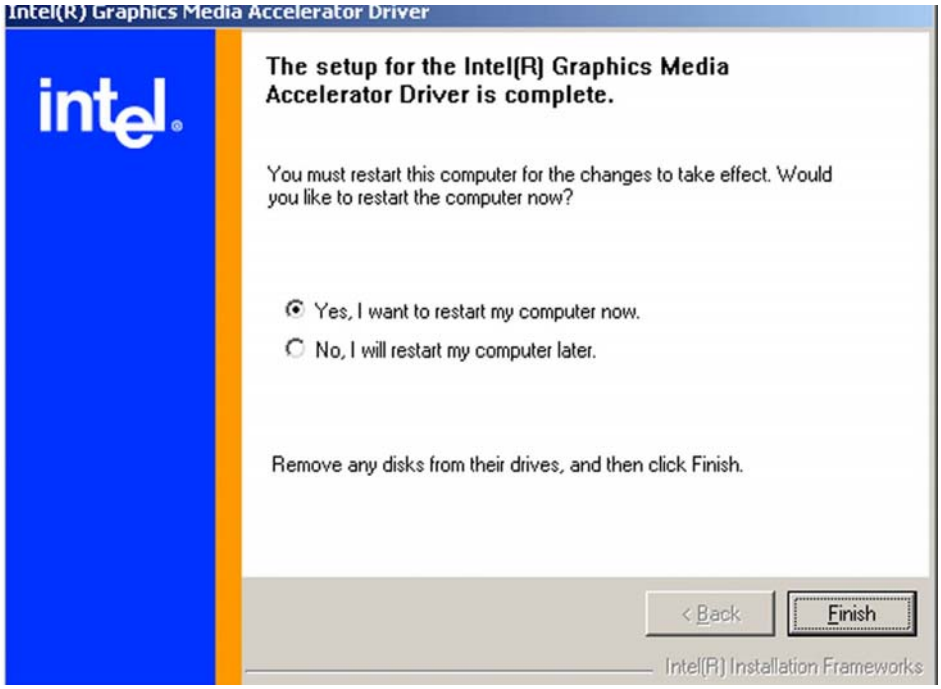

Intel(R) Graphics Media Accelerator Driver
intel
The setup for the Intel(R) Graphics Media Accelerator Driver is complete.
You must restart this computer for the changes to take effect. Would you like to restart the computer now?
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish.
< Back
Finish
Intel(R) Installation Frameworks

**Figure 7-15: GMA Driver Installation Complete**

**Step 14:** After selecting when to restart the computer in **Figure 7-15**, click **FINISH**.

## 7.5 Broadcom LAN Driver (for GbE LAN) Installation

To install the Broadcom LAN driver, please follow the steps below.

**Step 1:** Open **Windows Control Panel (Figure 7-16)**.

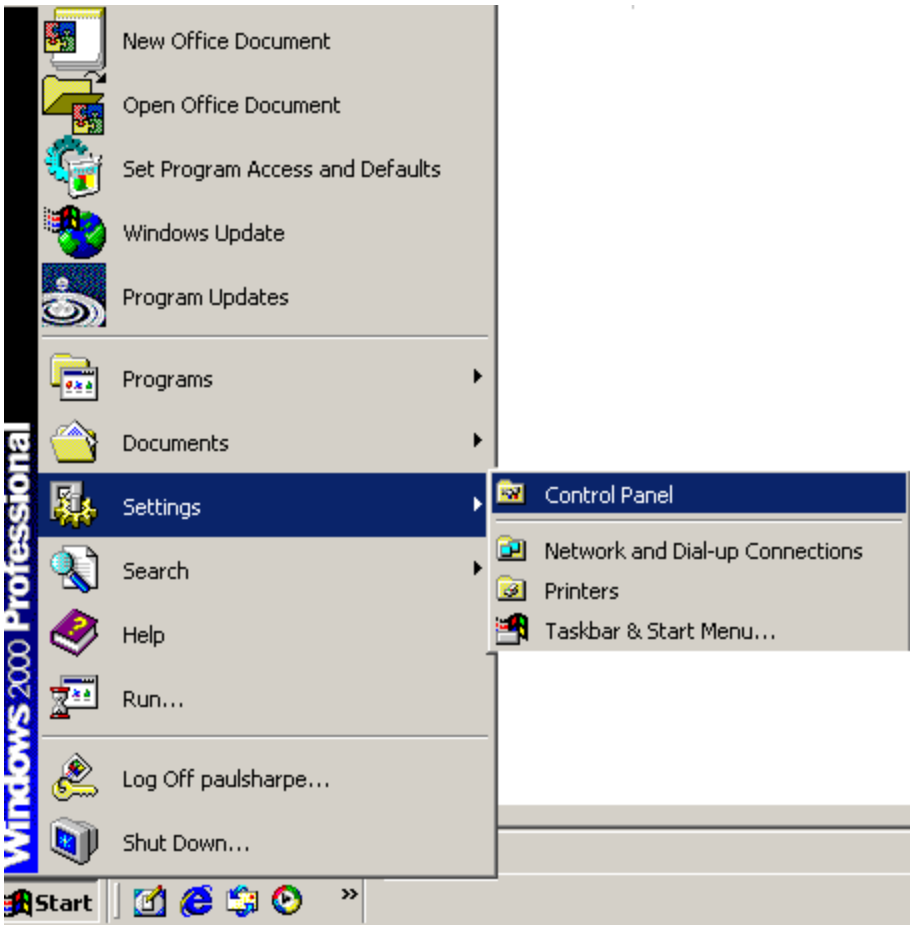



**Figure 7-16: Access Windows Control Panel**

**Step 2:** Double click the **System** icon (**Figure 7-17**).

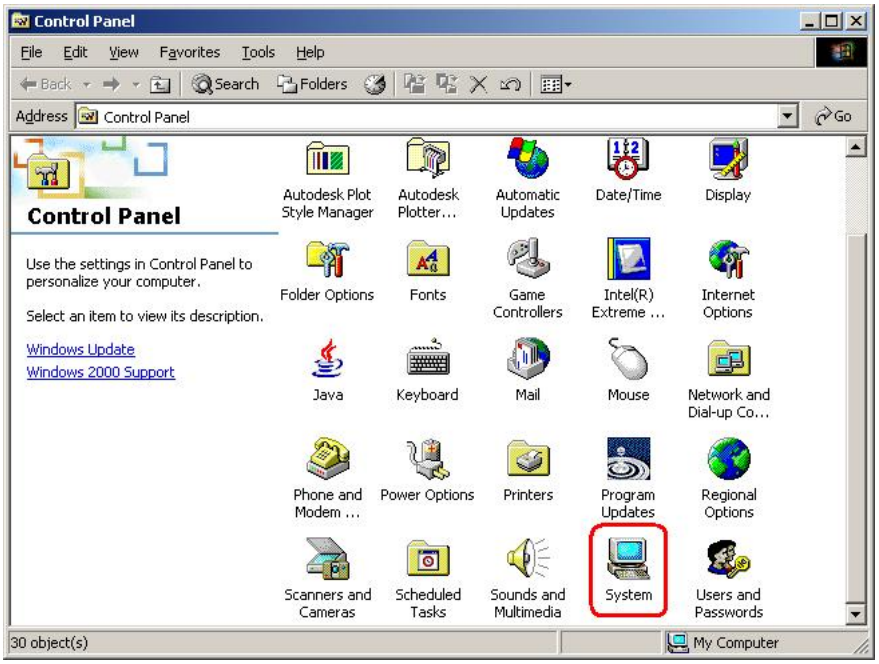



**Figure 7-17: Double Click the System Icon**

**Step 3:** Double click the **Device Manager** tab (**Figure 7-18**).

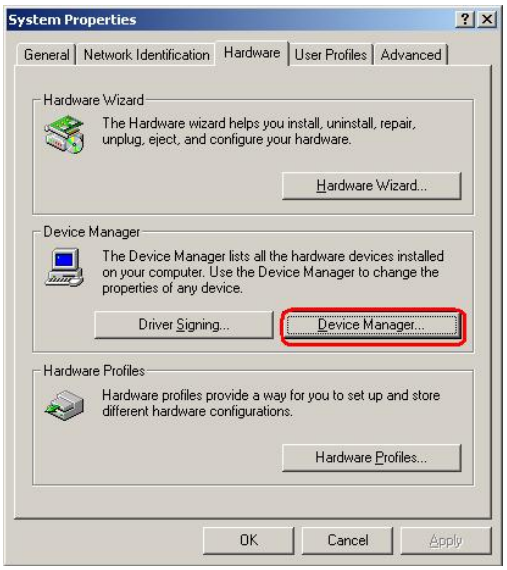

System Properties
General Network Identification Hardware User Profiles Advanced
Hardware Wizard
The Hardware wizard helps you install, uninstall, repair, unplug, eject, and configure your hardware.
Hardware Wizard...
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Driver Signing...
Device Manager...
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles...
OK
Cancel
Apply

**Figure 7-18: Double Click the Device Manager Tab**

**Step 4:** A list of system hardware devices appears (**Figure 7-19**).

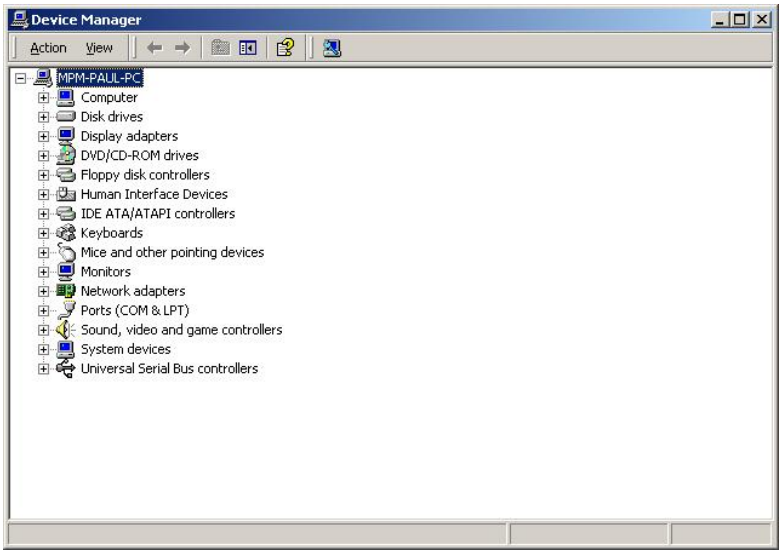



**Figure 7-19: Device Manager List**

**Step 5:** Double click the listed device that has question marks next to it. (This means Windows does not recognize the device).

**Step 6:** The **Device Driver Wizard** appears (**Figure 7-20**). Click **NEXT** to continue.

Upgrade Device Driver Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard upgrades drivers for the following hardware device:
532DD36TA0379HannStar U171
Upgrading to a newer version of a device driver may add functionality to or improve the performance of this device.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

**Figure 7-20: Search for Suitable Driver**

**Step 7:** Select "**Specify a Location**" in the **Locate Driver Files** window (**Figure 7-21**).

Click **NEXT** to continue.

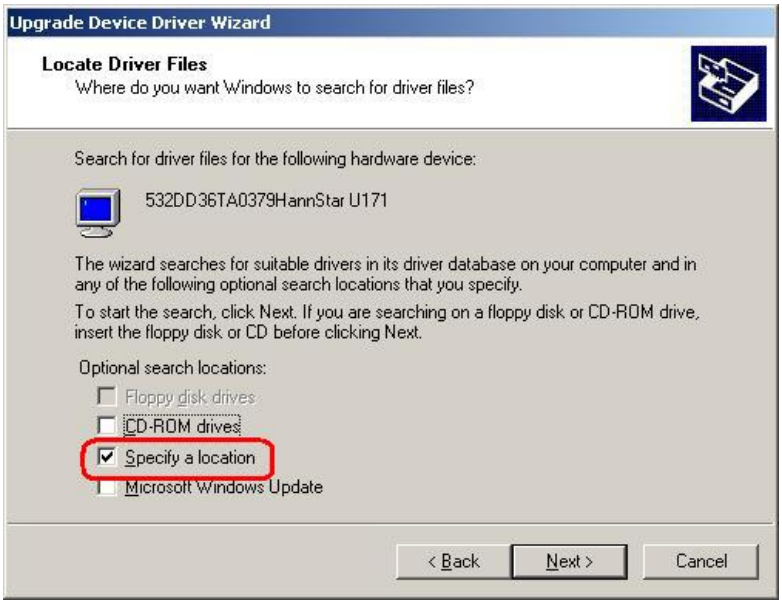

Upgrade Device Driver Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
532DD36TA0379HannStar U171
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

**Figure 7-21: Locate Driver Files**

**Step 8:** Select the proper OS folder under the "**X:\3-LAN\BROADCOM BCM57xx Drivers**" directory (**Figure 7-22**) in the location browsing window, where "**X:\"** is the system CD drive.

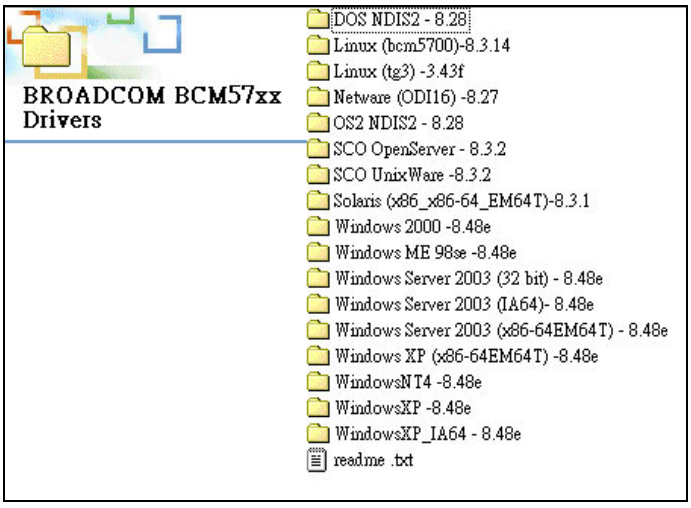



**Figure 7-22: Location Browsing Window**

**Step 9:** Click **OK** to continue. A driver files location menu window appears. Click **NEXT** to continue. The driver is installed.

## 7.6 Realtek HD Audio Driver (ALC883) Installation

To install the Realtek High Definition (HD) Audio driver, please follow the steps below.

### 7.6.1 BIOS Setup

**Step 1:** Enter the BIOS setup. To do this, reboot the system and press **DEL** during POST.

**Step 2:** Go to the Southbridge Configuration menu. Set the **Audio Controller** option to [Azalia]. See **Chapter 6** for details.

**Step 3:** Press **F10** to save the changes and exit the BIOS setup. The system reboots.

### 7.6.2 Driver Installation

**Step 1:** Insert the CD that came with the package.

**Step 2:** From the main driver menu, navigate to **X:\4-AUDIO\AC-KIT883HD\Windows** (or other appropriate OS). **X:** represents the system CD drive. A new window appears showing the folder contents (**Figure 6-26**).

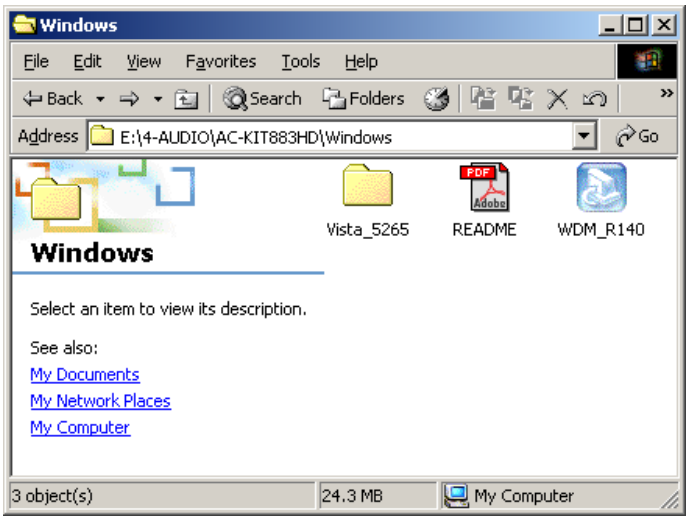



**Figure 7-23: 4-AUDIO\AC-KIT883HD\Windows Folder**

**Step 3:** Double-click the **WDM_R140** icon to begin the driver installation process.

**Step 4:** Once the **WDM_R140** icon is double clicked, the contents of the installation package are extracted. See **Figure 7-24.**

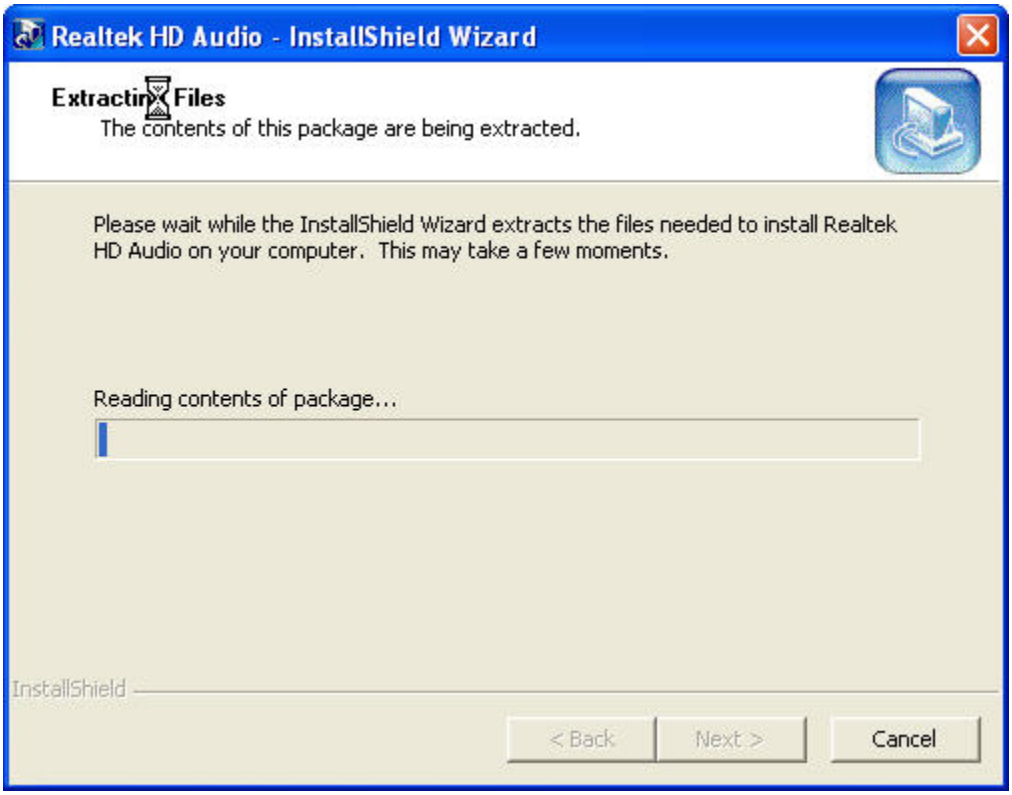

Realtek HD Audio - InstallShield Wizard
Extracting Files
The contents of this package are being extracted.
Please wait while the InstallShield Wizard extracts the files needed to install Realtek HD Audio on your computer. This may take a few moments.
Reading contents of package...
InstallShield
< Back
Next >
Cancel

**Figure 7-24: HD Audio Driver Setup Extracting Files**

**Step 5:** The **Welcome** screen appears. Click **NEXT**. See **Figure 7-25**.

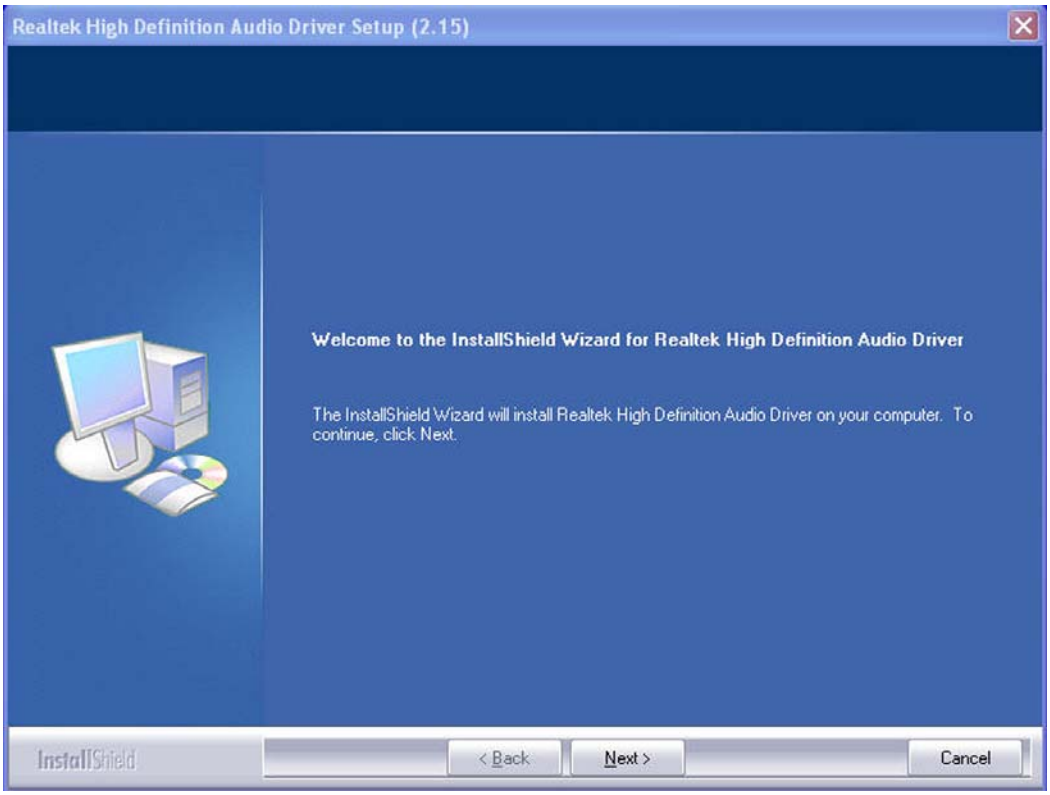

Realtek High Definition Audio Driver Setup (2.15)
Welcome to the InstallShield Wizard for Realtek High Definition Audio Driver
The InstallShield Wizard will install Realtek High Definition Audio Driver on your computer. To continue, click Next.
InstallShield
< Back
Next >
Cancel

**Figure 7-25: HD Audio Driver Setup Welcome Screen**

**Step 6:** The driver is automatically installed.

**Step 7:** After the driver installation process is complete, a confirmation screen shown in **Figure 7-26** appears.

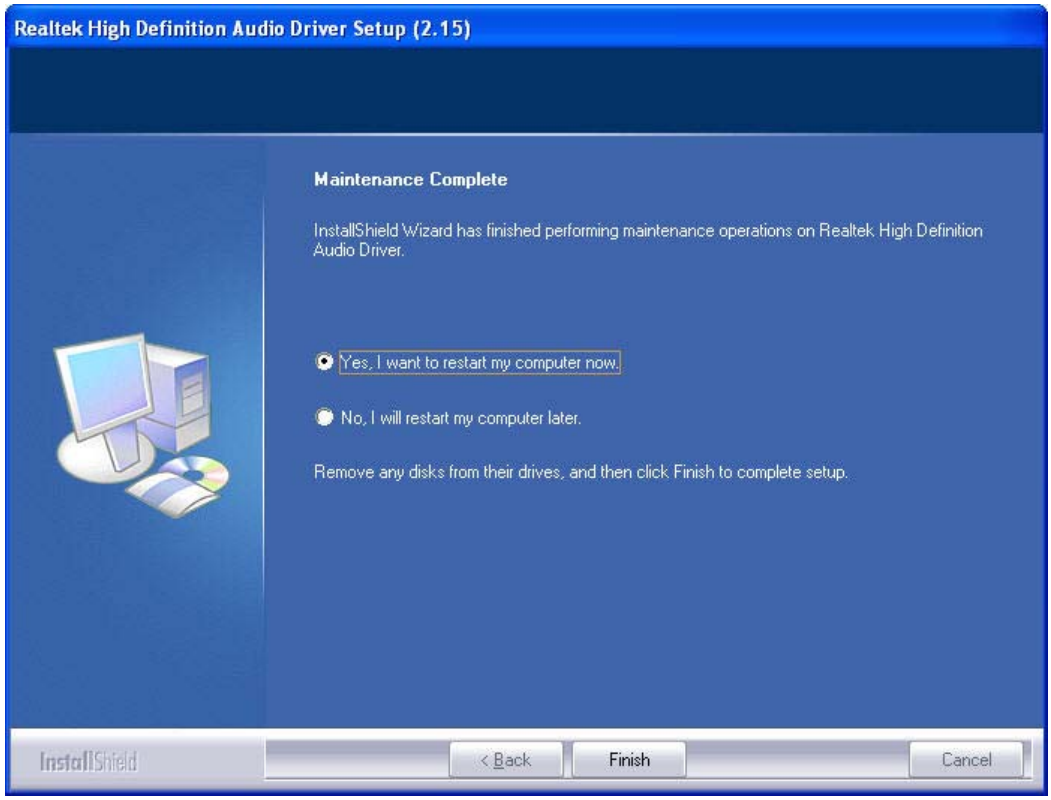

Realtek High Definition Audio Driver Setup (2.15)
Maintenance Complete
InstallShield Wizard has finished performing maintenance operations on Realtek High Definition Audio Driver.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
InstallShield
< Back
Finish
Cancel

**Figure 7-26: HD Audio Driver Installation Complete**

**Step 8:** The confirmation screen shown in **Figure 7-26** allows you to restart the computer immediately after the installation is complete or to restart the computer later. For the settings to take effect the computer must be restarted. Once you have decided when to restart the computer, click the "**FINISH**" button.

## 7.7 Realtek AC`97 Audio Driver (ALC665) Installation

To install the Realtek AC `97 audio driver, please follow the steps below.

### 7.7.1 BIOS Setup

**Step 1:** Enter the BIOS setup. To do this, reboot the system and press **DEL** during POST.

**Step 2:** Go to the Southbridge Configuration menu. Set the **Audio Controller** option to [AC`97]. See **Section** Error! Reference source not found. for details.

**Step 3:** Press **F10** to save the changes and exit the BIOS setup. The system reboots.

### 7.7.2 Driver Installation

**Step 1:** Insert the CD that came with the package.

**Step 2:** From the main driver menu, navigate to **X:\4-AUDIO\AC-KIT08R\Windows** (or other appropriate OS). **X:** represents the system CD drive. A new window appears showing the folder contents (**Figure 7-27**).

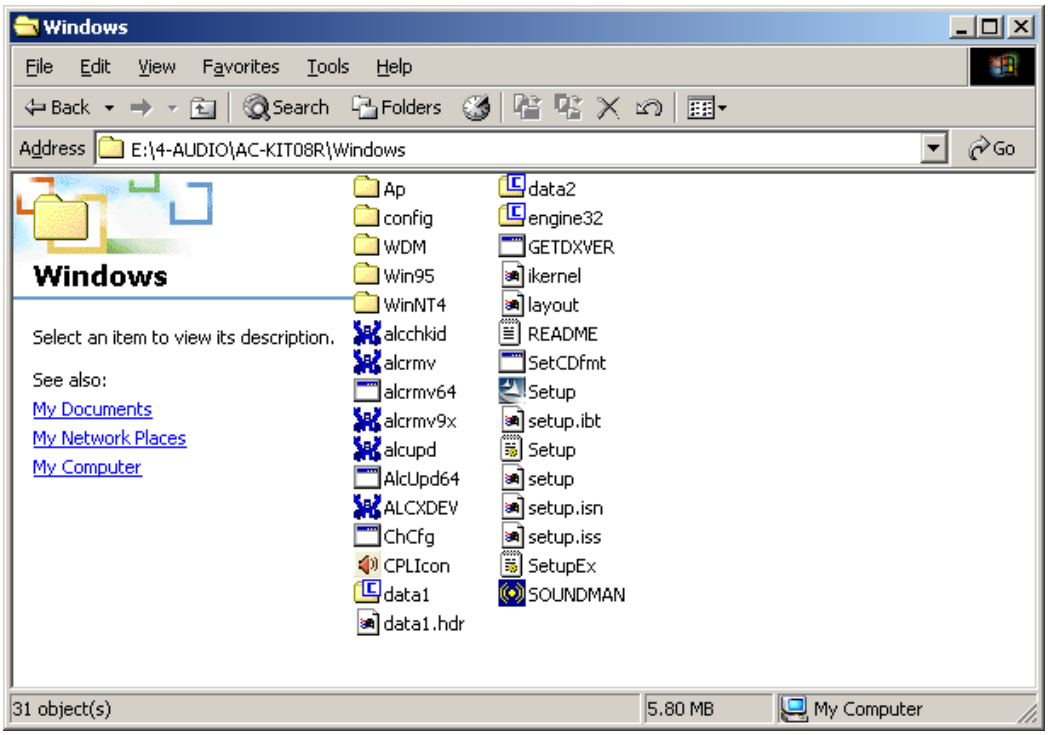



**Figure 7-27: CD 4-AUDIO\AC-KIT08R\Windows Folder**

**Step 3:** Double-click the **Setup.exe** file to begin the driver installation process.

**Step 4:** Once you double click the **Setup** icon, the install shield wizard for the audio driver starts. See **Figure 7-28.**

**Figure 7-28: AC`97 Audio Driver Install Shield Wizard Starting**

**Step 5:** The Realtek Audio Setup prepares the install shield to guide you through the rest of the setup process. See **Figure 7-25**.

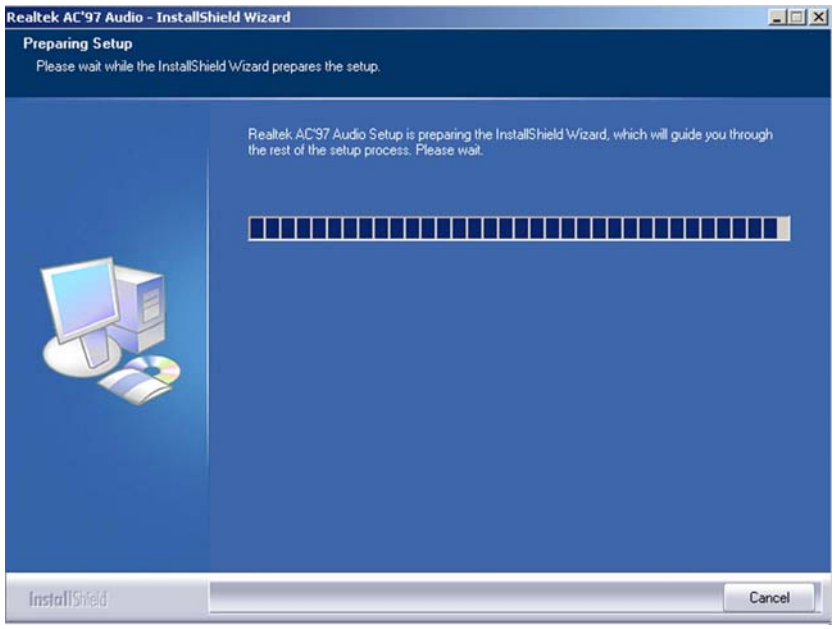

Realtek AC'97 Audio - InstallShield Wizard
Preparing Setup
Please wait while the InstallShield Wizard prepares the setup.
Realtek AC'97 Audio Setup is preparing the InstallShield Wizard, which will guide you through the rest of the setup process. Please wait.
InstallShield
Cancel

**Figure 7-29: AC`97 Audio Driver Setup Preparation**

**Step 6:** After the install shield is prepared, the welcome screen shown in **Figure 7-30** appears. To continue the installation process, click the "**NEXT**" button. The install shield starts to configure the new software as shown in **Figure 7-31**.

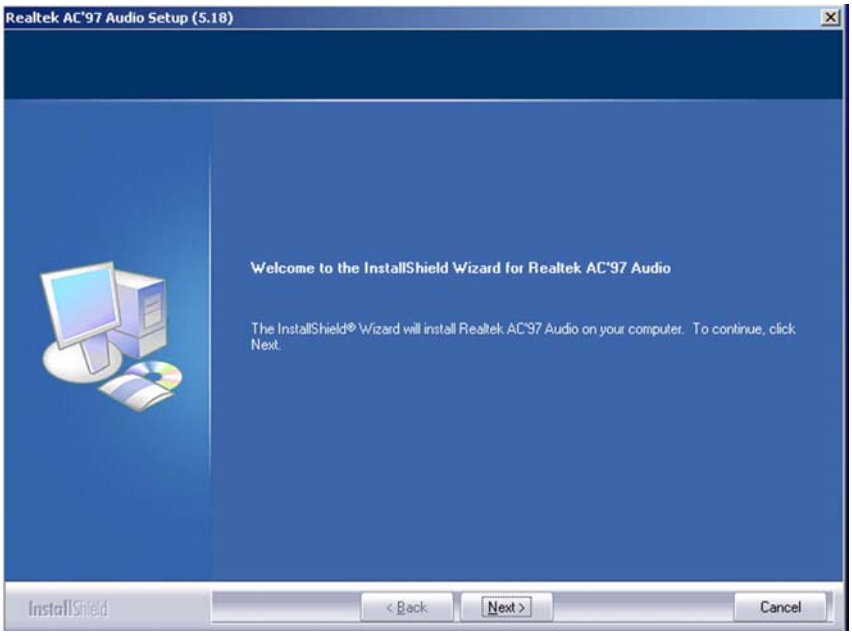

Realtek AC'97 Audio Setup (5.18)
Welcome to the InstallShield Wizard for Realtek AC'97 Audio
The InstallShield® Wizard will install Realtek AC'97 Audio on your computer. To continue, click Next.
InstallShield
< Back
Next >
Cancel

**Figure 7-30: AC`97 Audio Driver Welcome Screen**

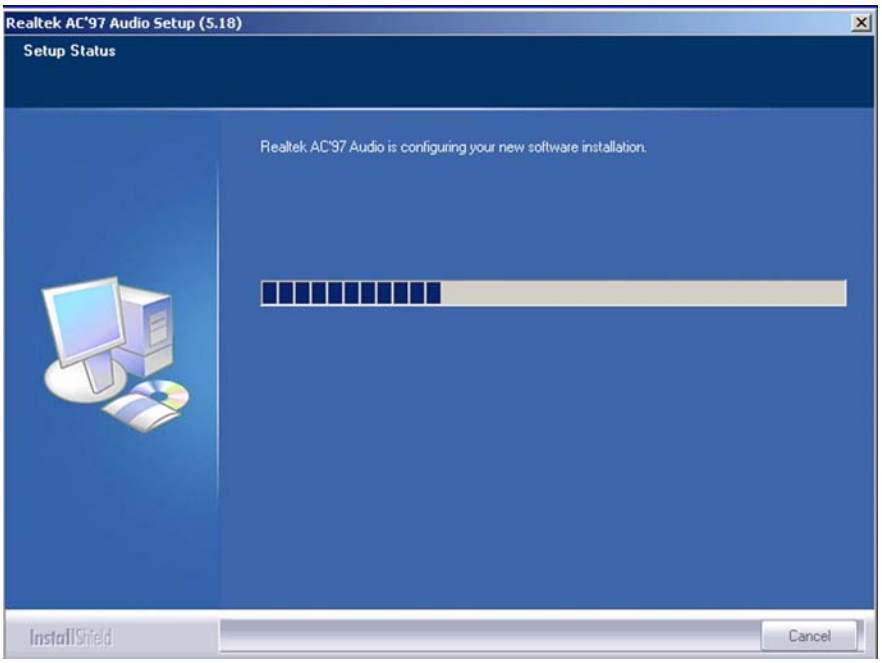



**Figure 7-31: AC`97 Audio Driver Software Configuration**

**Step 7:** At this stage the "**Digital Signal Not Found**" screen appears (**Figure 7-32**). To continue the installation process, click the "**YES**" button.

Digital Signature Not Found
The Microsoft digital signature affirms that software has been tested with Windows and that the software has not been altered since it was tested.
The software you are about to install does not contain a Microsoft digital signature. Therefore, there is no guarantee that this software works correctly with Windows.
Realtek AC'97 Audio
If you want to search for Microsoft digitally signed software, visit the Windows Update Web site at http://windowsupdate.microsoft.com to see if one is available.
Do you want to continue the installation?
Yes
No
More Info

**Figure 7-32: AC`97 Audio Driver Digital Signal**

**Step 8:** After clicking the "**YES**" button in **Figure 7-32**, the installation of the driver begins (**Figure 7-33**).

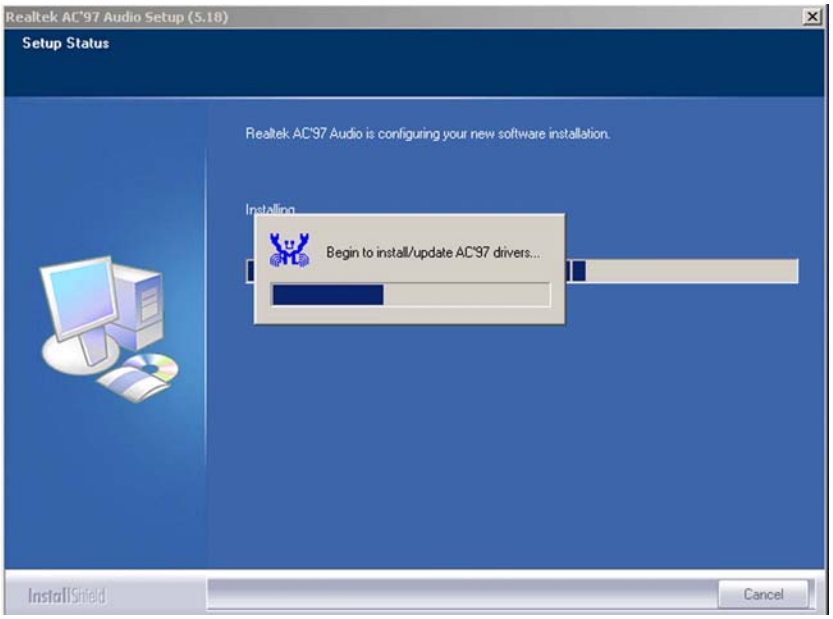



**Figure 7-33: AC`97 Audio Driver Installation Begins**

**Step 9:** After the driver installation process is complete, a confirmation screen shown in **Figure 7-34** appears.

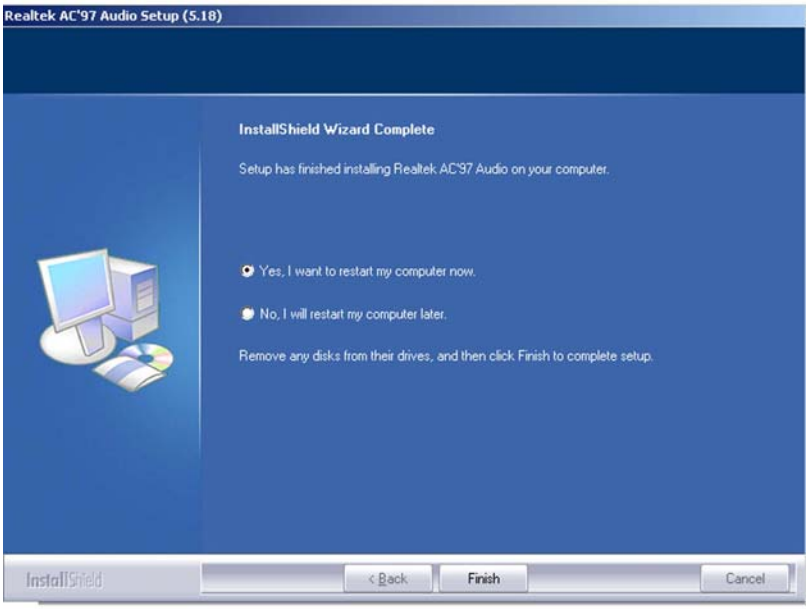

Realtek AC'97 Audio Setup (5.18)
InstallShield Wizard Complete
Setup has finished installing Realtek AC'97 Audio on your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
InstallShield
< Back
Finish
Cancel

**Figure 7-34: AC`97 Audio Driver Installation Complete**

**Step 10:** The confirmation screen shown in **Figure 7-34** allows you to restart the computer immediately after the installation is complete or to restart the computer later. For the settings to take effect the computer must be restarted. Once you have decided when to restart the computer, click the "**FINISH**" button.

## 7.8 Intel Matrix Storage Manager Installation

To install the Intel® Matrix Storage Manager driver, please follow the steps below:

**Step 1:** Select SATA from the list in **Figure 7-2**.

**Step 2:** A new window opens (**Figure 7-35**).

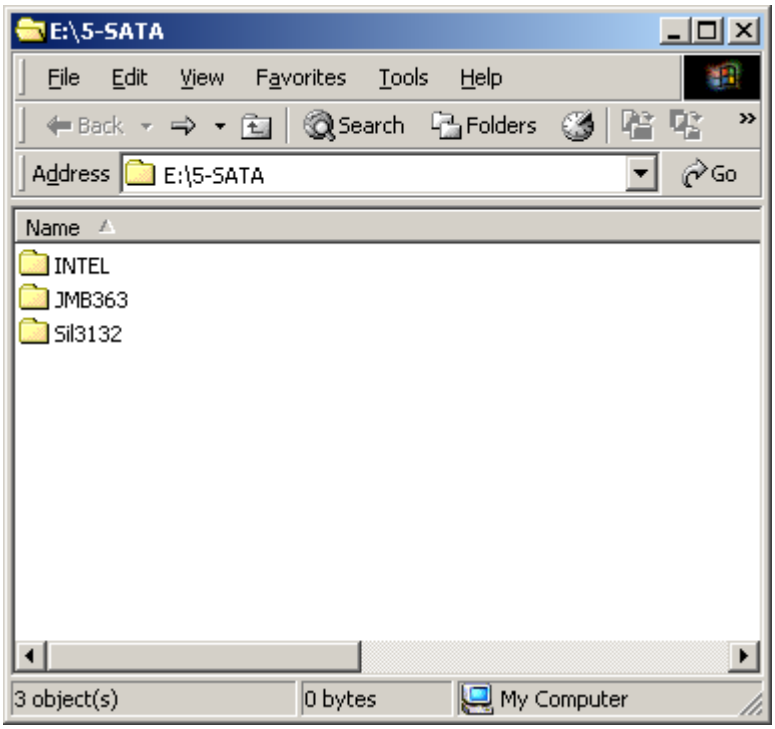



**Figure 7-35: SATA RAID Driver Installation Program**

**Step 3:** Double-click the **INTEL** folder.

**Step 4:** Double-click the **iata62_cd.exe** program icon in **Figure 7-36**.

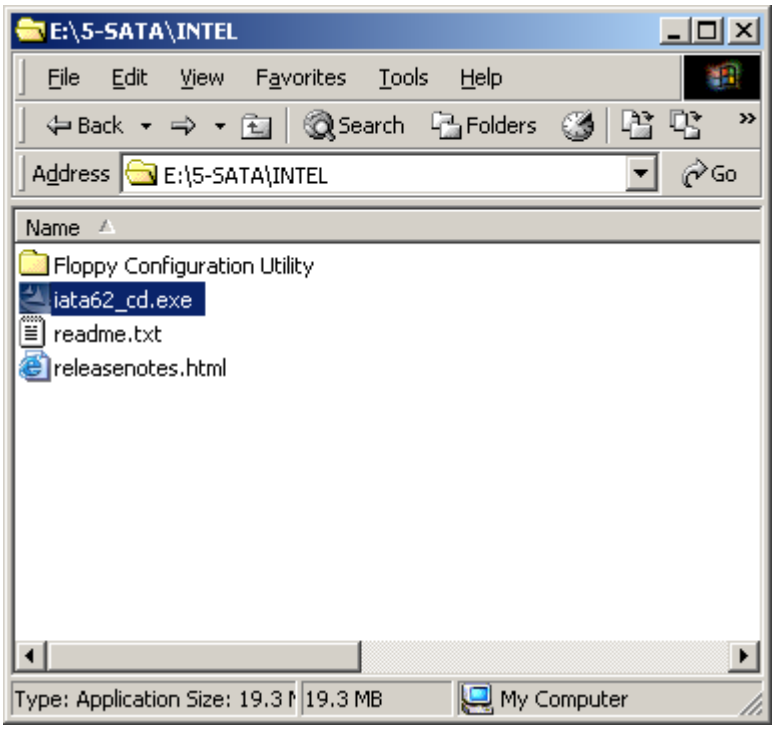



**Figure 7-36: SATA RAID Setup Program Icon**

**Step 5:** **Figure** 7-37 shows the **InstallShield Wizard** preparing to guide the user through the rest of the process.

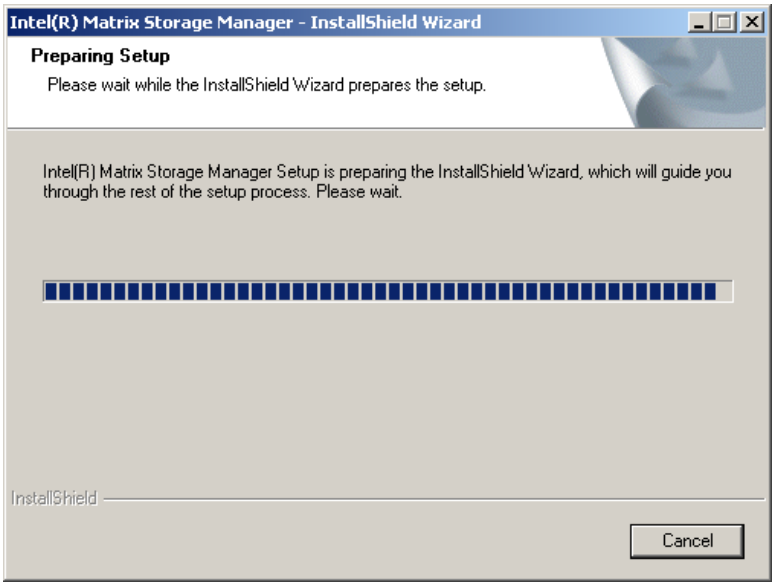

Intel(R) Matrix Storage Manager - InstallShield Wizard
Preparing Setup
Please wait while the InstallShield Wizard prepares the setup.
Intel(R) Matrix Storage Manager Setup is preparing the InstallShield Wizard, which will guide you through the rest of the setup process. Please wait.
InstallShield
Cancel

**Figure 7-37: InstallShield Wizard Setup Screen**

**Step 6:** Figure 7-38 shows the Matrix Storage Manager software configuring the installation process.

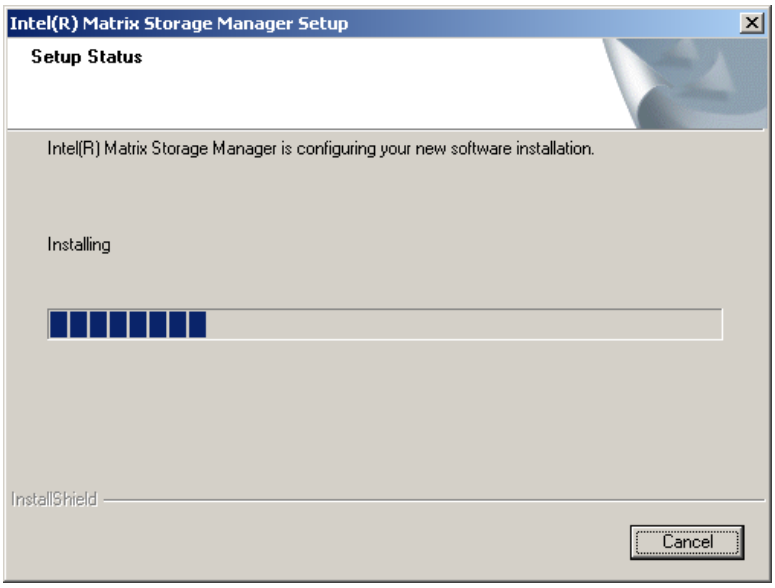



**Figure 7-38: Matrix Storage Manager Setup Screen**

**Step 7:** **Figure 7-39** shows the **Matrix Storage Manager** welcome screen.

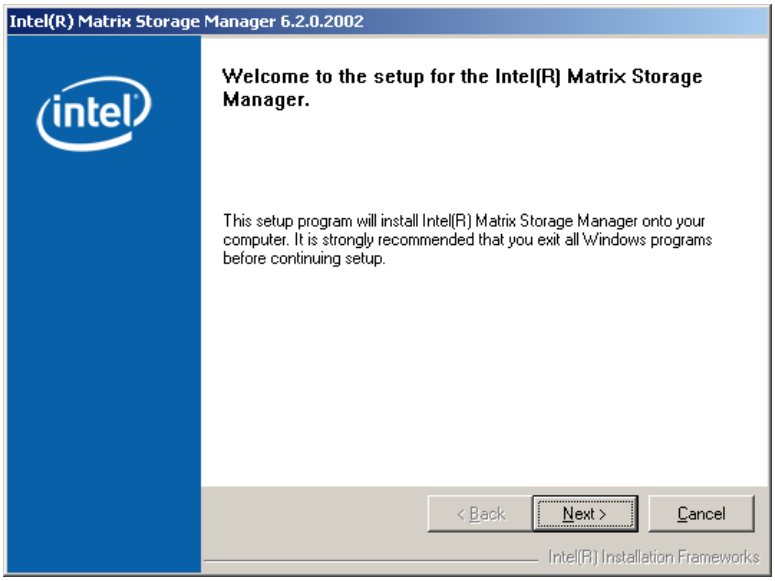

Intel(R) Matrix Storage Manager 6.2.0.2002
Welcome to the setup for the Intel(R) Matrix Storage Manager.
This setup program will install Intel(R) Matrix Storage Manager onto your computer. It is strongly recommended that you exit all Windows programs before continuing setup.
< Back
Next >
Cancel
Intel(R) Installation Frameworks

**Figure 7-39: Matrix Storage Manager Welcome Screen**

**Step 8:** Click **NEXT** and a warning appears (**Figure 7-40**). Read the warning carefully and decide whether or not to continue the installation process.

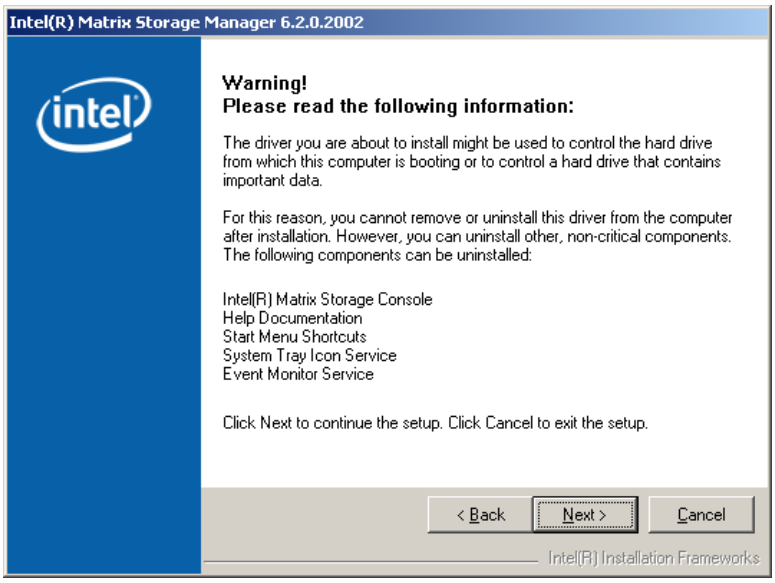

Intel(R) Matrix Storage Manager 6.2.0.2002
Warning!
Please read the following information:
The driver you are about to install might be used to control the hard drive from which this computer is booting or to control a hard drive that contains important data.
For this reason, you cannot remove or uninstall this driver from the computer after installation. However, you can uninstall other, non-critical components. The following components can be uninstalled:
Intel(R) Matrix Storage Console
Help Documentation
Start Menu Shortcuts
System Tray Icon Service
Event Monitor Service
Click Next to continue the setup. Click Cancel to exit the setup.
< Back
Next >
Cancel
Intel(R) Installation Frameworks

**Figure 7-40: Matrix Storage Manager Warning Screen**

**Step 9:** Click **NEXT** and a license agreement appears (**Figure 7-41**).

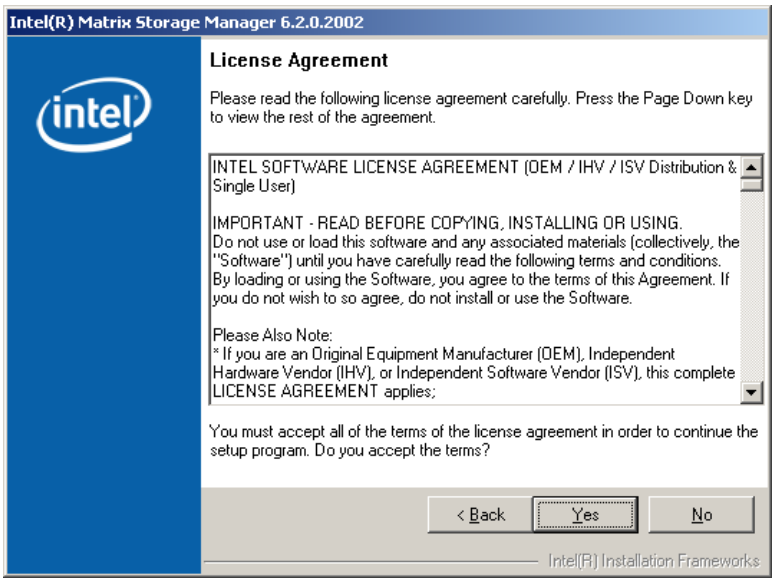

Intel(R) Matrix Storage Manager 6.2.0.2002
License Agreement
Please read the following license agreement carefully. Press the Page Down key to view the rest of the agreement.
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;
You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms?
< Back
Yes
No
Intel(R) Installation Frameworks

**Figure 7-41: Matrix Storage Manager License Agreement**

**Step 10:** Read the license agreement. To accept the terms and conditions stipulated in the license agreement shown, click **YES** and the Readme information file shown in **Figure 7-42** appears.

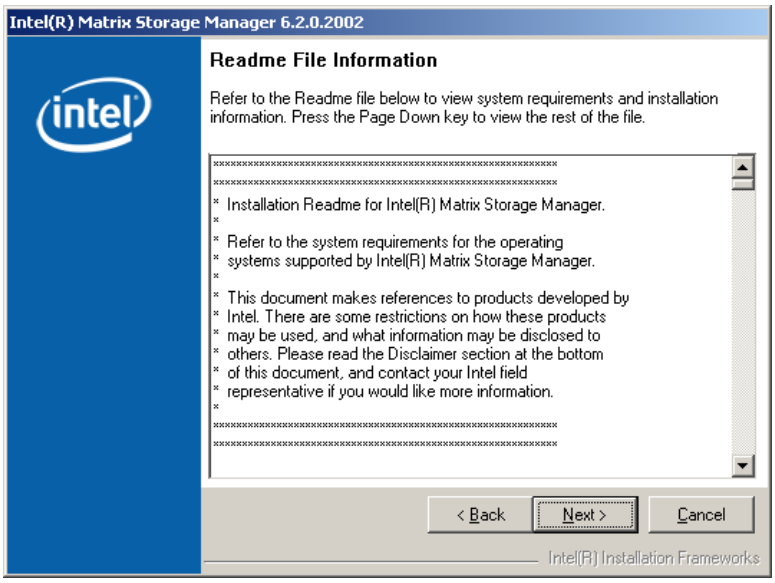

Intel(R) Matrix Storage Manager 6.2.0.2002
Readme File Information
Refer to the Readme file below to view system requirements and installation information. Press the Page Down key to view the rest of the file.
* Installation Readme for Intel(R) Matrix Storage Manager.
* Refer to the system requirements for the operating
* systems supported by Intel(R) Matrix Storage Manager.
* This document makes references to products developed by
* Intel. There are some restrictions on how these products
* may be used, and what information may be disclosed to
* others. Please read the Disclaimer section at the bottom
* of this document, and contact your Intel field
* representative if you would like more information.
< Back
Next >
Cancel
Intel(R) Installation Frameworks

**Figure 7-42: Matrix Storage Manager Readme File**

**Step 11:** Read the Readme file information and click **NEXT**.

**Step 12:** After the driver installation process is complete, a confirmation screen appears (**Figure 7-43**).

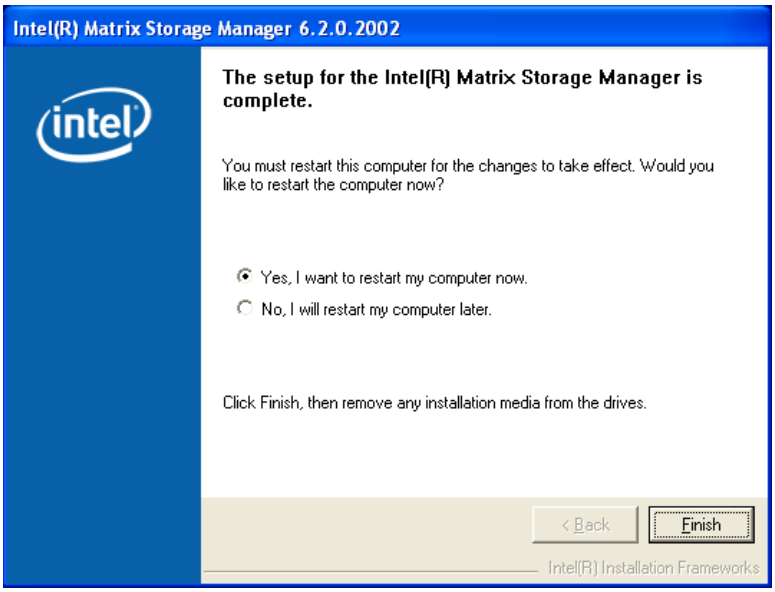

Intel(R) Matrix Storage Manager 6.2.0.2002
The setup for the Intel(R) Matrix Storage Manager is complete.
You must restart this computer for the changes to take effect. Would you like to restart the computer now?
Yes, I want to restart my computer now.
No, I will restart my computer later.
Click Finish, then remove any installation media from the drives.
< Back
Finish
Intel(R) Installation Frameworks

**Figure 7-43: Matrix Storage Manager Setup Complete**

**Step 13:** The confirmation screen offers the option of restarting the computer now or later. For the settings to take effect, the computer must be restarted. Click **FINISH** to restart the computer.

Appendix

A

# BIOS Options

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Appendix

B

# DIO Interface

## B.1 DIO Interface Introduction

The DIO connector on the PICOe-9452 is interfaced to GIO ports on the iTE Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

**NOTE:**

For further information, please refer to the datasheet for the iTE Super I/O chipset.

## B.2 DIO Connector Pinouts

The following table describes how the DIO connector pins are connected to the Super I/O GPIO port 1.

| PIN NO. | DESCRIPTION | PIN NO. | DESCRIPTION |
|---|---|---|---|
| 1 | GND | 2 | VCC |
| 3 | Output 3 | 4 | Output 2 |
| 5 | Output 1 | 6 | Output 0 |
| 7 | Input 3 | 8 | Input 2 |
| 9 | Input 1 | 10 | Input 0 |

## B.3 Assembly Language Samples

### B.3.1 Enable the DIO Input Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O input functions is listed below.

| | | |
|---|---|---|
| **MOV** | **AX, 6F08H** | Sets the digital port as input |
| **INT** | **15H** | Initiates the INT 15H BIOS call |

### B.3.2 Enable the DIO Output Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O output functions is listed below.

| | | |
|---|---|---|
| **MOV** | **AX, 6F09H** | Sets the digital port as output |
| **MOV** | **BL, 09H** | |
| **INT** | **15H** | Initiates the INT 15H BIOS call |

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Appendix

C

# Watchdog Timer

**NOTE:**

The following discussion applies to DOS environment. IEI support is contacted or the IEI website visited for specific drivers for more sophisticated operating systems, e.g., Windows and Linux.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer:

**INT 15H:**

| AH – 6FH Sub-function: | |
|---|---|
| AL – 2: | Sets the Watchdog Timer's period. |
| BL: | Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup). |

**Table C-1: AH-6FH Sub-function**

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. While the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the Watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

**NOTE:**

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

## Example program:

```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30          ;time-out value is 48 seconds
        INT      15H
 ;
; ADD THE APPLICATION PROGRAM HERE
;
        CMP      EXIT_AP, 1     ;is the application over?
        JNE      W_LOOP         ;No, restart the application

        MOV     AX, 6F02H       ;disable Watchdog Timer
        MOV     BL, 0           ;
        INT      15H
;
; EXIT ;
```

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Appendix

D

# Address Mapping

## D.1 Address Map

| I/O address Range | Description |
|---|---|
| 000-01F | DMA Controller |
| 020-021 | Interrupt Controller |
| 040-043 | System time |
| 060-06F | Keyboard Controller |
| 070-07F | System CMOS/Real time Clock |
| 080-09F | DMA Controller |
| 0A0-0A1 | Interrupt Controller |
| 0C0-0DF | DMA Controller |
| 0F0-0FF | Numeric data processor |
| 1F0-1F7 | Primary IDE Channel |
| 2F8-2FF | Serial Port 2 (COM2) |
| 378-37F | Parallel Printer Port 1 (LPT1) |
| 3B0-3BB | Intel Graphics Controller |
| 3C0-3DF | Intel Graphics Controller |
| 3F6-3F6 | Primary IDE Channel |
| 3F7-3F7 | Standard floppy disk controller |
| 3F8-3FF | Serial Port 1 (COM1) |

**Table D-1: IO Address Map**

## D.2 1st MB Memory Address Map

| Memory address | Description |
|---|---|
| 00000-9FFFF | System memory |
| A0000-BFFFF | VGA buffer |
| F0000-FFFFF | System BIOS |
| 1000000- | Extend BIOS |

**Table D-2: 1st MB Memory Address Map**

## D.3 IRQ Mapping Table

| IRQ0 | System Timer | IRQ8 | RTC clock |
|---|---|---|---|
| IRQ1 | Keyboard | IRQ9 | ACPI |
| IRQ2 | Available | IRQ10 | LAN |
| IRQ3 | COM2 | IRQ11 | LAN/USB2.0/SATA |
| IRQ4 | COM1 | IRQ12 | PS/2 mouse |
| IRQ5 | SMBus Controller | IRQ13 | FPU |
| IRQ6 | FDC | IRQ14 | Primary IDE |
| IRQ7 | Available | IRQ15 | Secondary IDE |

**Table D-3: IRQ Mapping Table**

## D.4 DMA Channel Assignments

| Channel | Function |
|---|---|
| 0 | Available |
| 1 | Available |
| 2 | Floppy disk (8-bit transfer) |
| 3 | Available |
| 4 | Cascade for DMA controller 1 |
| 5 | Available |
| 6 | Available |
| 7 | Available |

**Table D-4: IRQ Mapping Table**

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Appendix

E

# Intel® Matrix Storage Manager

## E.1 Introduction

The Intel® ICH7-M chipset can provide data protection for serial ATA (SATA) disks via the Intel® Matrix Storage Manager using one of three fault-tolerant RAID levels: RAID 1, 5 or 10. When using two hard drives, matrix RAID allows RAID 0 and RAID 1 functions to be combined, where critical files can be stored on RAID 1, and RAID 0 can be used for non-critical items such as software. RAID 5 and RAID 0 can be combined to provide higher performance, capacity, and fault tolerance.

**CAUTION!**

A configured RAID volume (which may consist of multiple hard drives) appears to an operating system as a contingent storage space. The operating system will not be able to distinguish the physical disk drives contained in a RAID configuration.

### E.1.1 Precautions

One key benefit a RAID configuration brings is that a single hard drive can fail within a RAID array without damaging data. With RAID1 array, a failed drive can be replaced and the RAID configuration restored.

**WARNING!**

Irrecoverable data loss occurs if a working drive is removed when trying to remove a failed drive. It is strongly recommended to mark the physical connections of all SATA disk drives. Drive locations can be identified by attaching stickers to the drive bays. If a drive member of a RAID array should fail, the failed drive can then be correctly identified.

**CAUTION!**

Do not accidentally disconnect the SATA drive cables. Carefully route the cables within the chassis to avoid system down time.

## E.2 Features and Benefits

- Supports RAID levels 0, 1, 5 and 10
- Supports connectivity to two or more disk drives
- Supported Operating Systems include: Windows XP, Windows Server 2003 and Windows Vista

## E.3 Accessing the Intel® Matrix Storage Manager

To access the Intel® Matrix Storage Manager, please follow the steps below.

**Step 1:** **Connect SATA drives to the system**. Connect two or more SATA drives to the system. Make sure the drives have the same capacity, are the same type and have the same speed.

**NOTE:**

Make sure the SATA drives are EXACTLY the same when they are configured in a RAID configuration. If they are not the same size, disk drive capacity is sacrificed and overall performance affected.

**Step 2:** **Enable SATA drives in BIOS**. Start the computer and access the **BIOS** setup program. Enable **SATA** support for all IDE devices. Refer to the applicable BIOS configuration section in this user manual.

**Step 3:** **Save and Exit BIOS**. After the **SATA** support option is enabled, save and exit the **BIOS**.

**Step 4:** **Reboot the system**. Reboot the system after saving and exiting the **BIOS**.

**Step 5:** **Press Ctrl+I**. During the system boot process, press **Ctrl+I** when prompted to enter the RAID configuration software.

**Step 6:** **Configure the RAID settings**. Use the Intel® Matrix Storage Manager to configure the RAID array. Brief descriptions of configuration options are given below.

**Step 7:** **Install the OS**. After the RAID array has been configured, install the OS. To do this, please refer to the documentation that came with the OS.

## E.4 RAID Configuration

### E.4.1 Creating a RAID Volume

**WARNING!**

All data previously stored on the member drives of a RAID configuration are destroyed during the RAID initialization process. If “used” drives are used to create a RAID array, make sure the data has been moved or backed up before creating a RAID array out of the disk drives.

**Step 1:** **Select** "**Create RAID Volume**." Use the arrow keys to highlight **Create RAID Volume** and press **ENTER**. See Figure E-1.

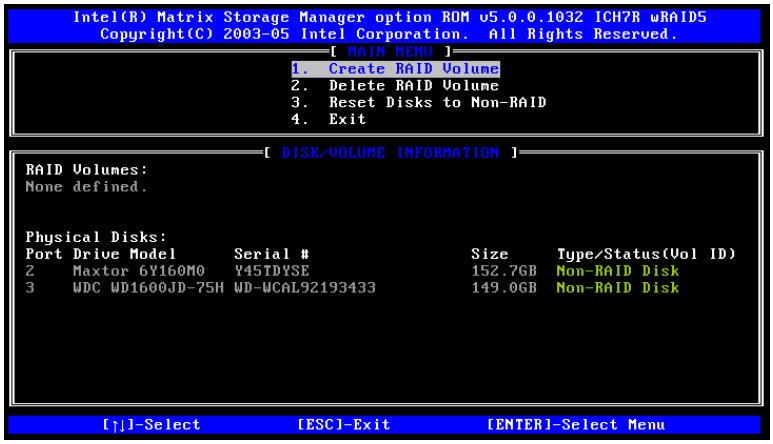
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[ DISK/VOLUME INFORMATION ]
RAID Volumes:
None defined.
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Non-RAID Disk
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Non-RAID Disk
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-1: Matrix Storage Manager Main Menu**

**Step 2:** **Name the RAID volume**. Enter a name for the RAID volume, or press **ENTER** to accept the default volume name. Upper and lower case alphabetic, numeric, space, and underscore characters are all applicable for naming an array. See Figure E-2.

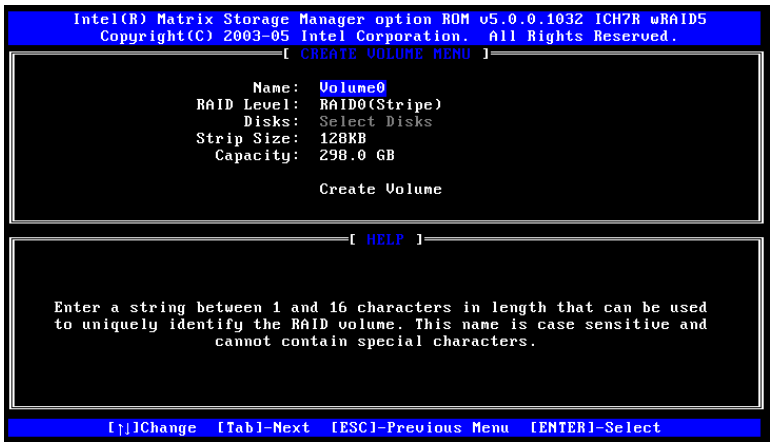
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ CREATE VOLUME MENU ]
Name: Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 298.0 GB
Create Volume
[ HELP ]
Enter a string between 1 and 16 characters in length that can be used to uniquely identify the RAID volume. This name is case sensitive and cannot contain special characters.
[↑↓]Change [Tab]-Next [ESC]-Previous Menu [ENTER]-Select

**Figure E-2: Create RAID Volume Name**

**Step 3:** **Choose the RAID level**. Select a RAID level from the list. RAID levels include RAID 0, 1, 5 and 10. See Figure E-3.

**NOTE:**

RAID 0 and RAID1 levels require a minimum of two hard drives.

RAID 10 level requires a minimum of four hard drives.

RAID5 level requires a minimum of three hard drives.

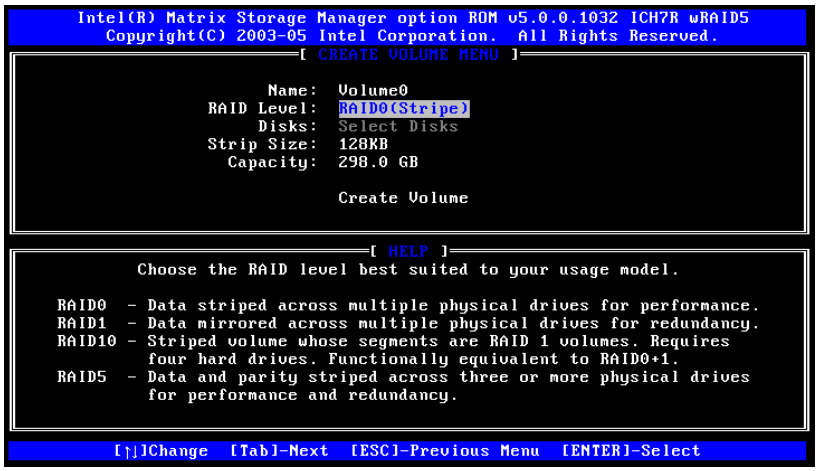
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ CREATE VOLUME MENU ]
Name: Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 298.0 GB
Create Volume
[ HELP ]
Choose the RAID level best suited to your usage model.
RAID0 - Data striped across multiple physical drives for performance.
RAID1 - Data mirrored across multiple physical drives for redundancy.
RAID10 - Striped volume whose segments are RAID 1 volumes. Requires four hard drives. Functionally equivalent to RAID0+1.
RAID5 - Data and parity striped across three or more physical drives for performance and redundancy.
[↑↓]Change [Tab]-Next [ESC]-Previous Menu [ENTER]-Select

**Figure E-3: Choose the Raid Level**

**Step 4:** **Select the Stripe Size**. Select a stripe size from the list. See Figure E-4.

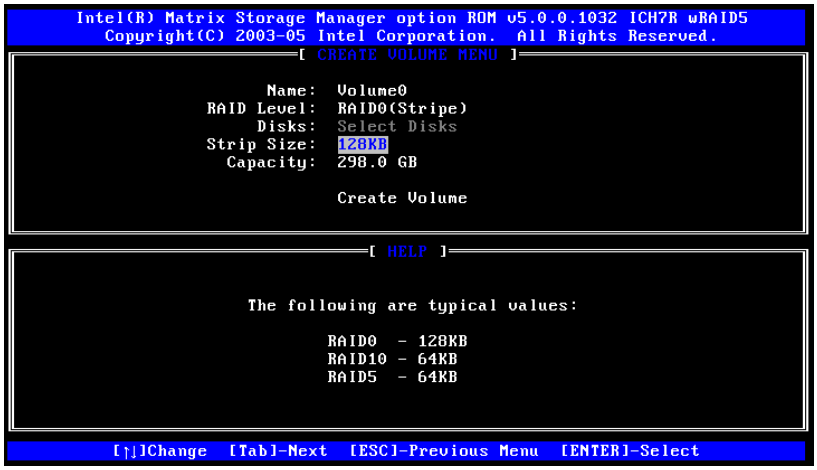


**Figure E-4: Select the Stripe Size**

**Step 5:** **Enter the Volume Capacity**. Enter the volume capacity, or press **ENTER** to accept the default capacity. See Figure E-5.

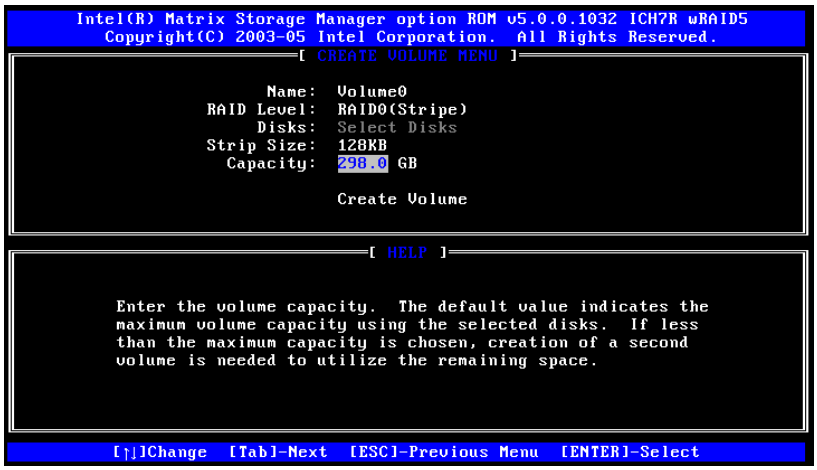
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ CREATE VOLUME MENU ]
Name: Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 298.0 GB
Create Volume
[ HELP ]
Enter the volume capacity. The default value indicates the
maximum volume capacity using the selected disks. If less
than the maximum capacity is chosen, creation of a second
volume is needed to utilize the remaining space.
[↑↓]Change [Tab]-Next [ESC]-Previous Menu [ENTER]-Select

**Figure E-5: Enter the Volume Capacity**

**Step 6:** **Create the RAID Volume**. Press **ENTER** to create the RAID volume as specified. See Figure E-6.

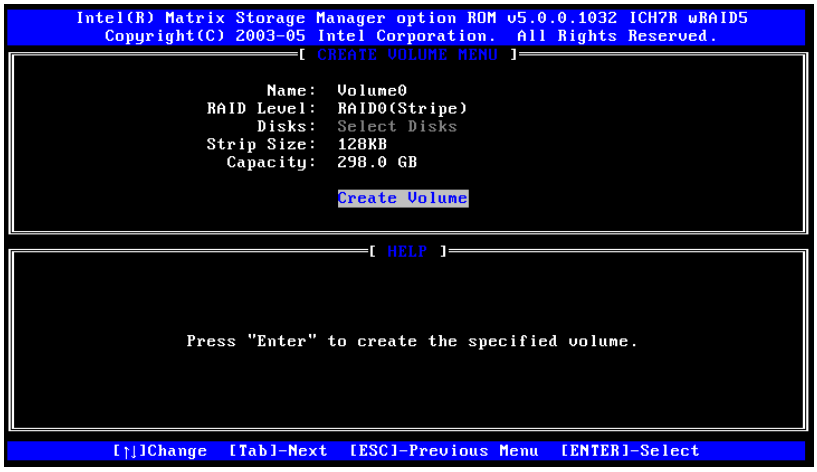
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ CREATE VOLUME MENU ]
Name: Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 298.0 GB
Create Volume
[ HELP ]
Press "Enter" to create the specified volume.
[↑↓]Change [Tab]-Next [ESC]-Previous Menu [ENTER]-Select

**Figure E-6: Create the RAID Volume**

**Step 7:** **Create RAID Volume Verification**. After reading the warning, press **Y** to create the RAID volume as specified, or **N** to return to the **Create RAID Volume** menu. See Figure E-7.

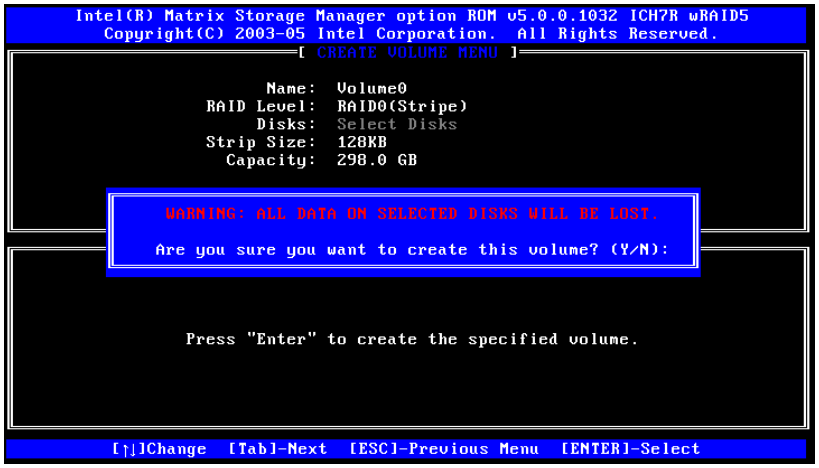
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ CREATE VOLUME MENU ]
Name: Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 298.0 GB
WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.
Are you sure you want to create this volume? (Y/N):
Press "Enter" to create the specified volume.
[↑↓]Change [Tab]-Next [ESC]-Previous Menu [ENTER]-Select

**Figure E-7: Create RAID Volume Verification**

### E.4.2 Deleting a RAID Volume

**WARNING!**

All data stored on the member drives of a RAID volume are destroyed during the RAID deletion process. Make sure any data to be saved has been moved or backed up before deleting a RAID volume.

**Step 1:** **Select** "**Delete RAID Volume**." Use the arrow keys to highlight **Delete RAID Volume** and press **ENTER**. See Figure E-8.

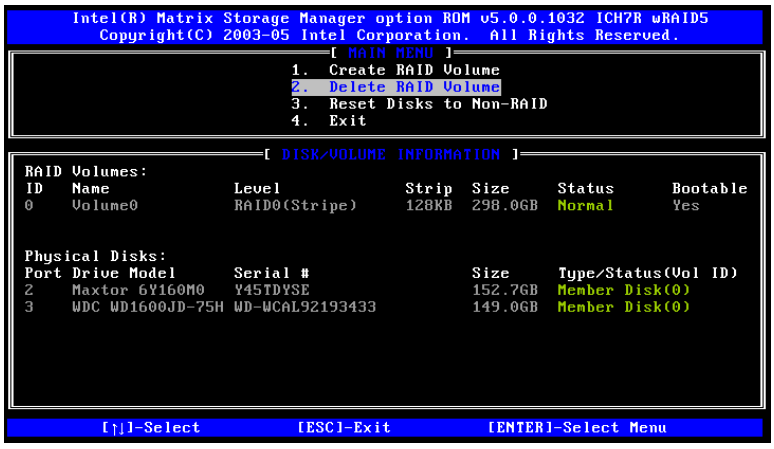
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[ DISK/VOLUME INFORMATION ]
RAID Volumes:
ID Name Level Strip Size Status Bootable
0 Volume0 RAID0(Stripe) 128KB 298.0GB Normal Yes
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Member Disk(0)
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Member Disk(0)
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-8: Delete RAID Volume Menu**

**Step 2:** **Select RAID Volume to be Deleted**. Use the arrow keys to highlight the RAID volume to be deleted and press **ENTER**. See Figure E-9.

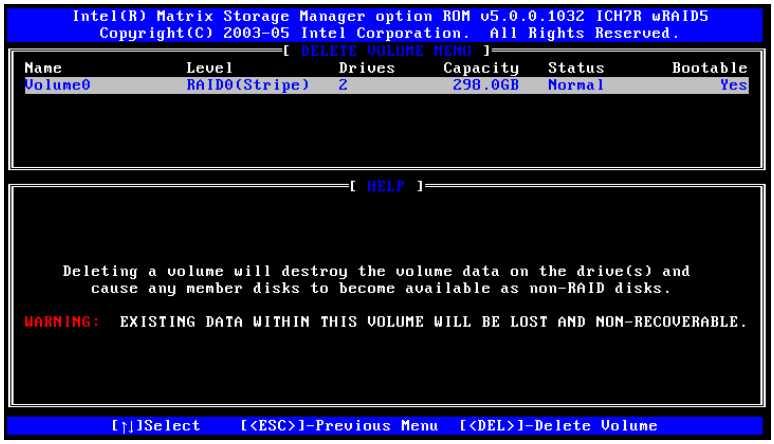
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ DELETE VOLUME MENU ]
Name Level Drives Capacity Status Bootable
Volume0 RAID0(Stripe) 2 298.0GB Normal Yes
[ HELP ]
Deleting a volume will destroy the volume data on the drive(s) and cause any member disks to become available as non-RAID disks.
WARNING: EXISTING DATA WITHIN THIS VOLUME WILL BE LOST AND NON-RECOVERABLE.
[↑↓]Select [<ESC>]-Previous Menu [<DEL>]-Delete Volume

**Figure E-9: Select RAID Volume to be Deleted**

**Step 3:** **Delete Volume Verification**. After reading the warning, press **Y** to delete the specified RAID volume, or **N** to return to the **Delete Volume** menu.

See Figure E-10.

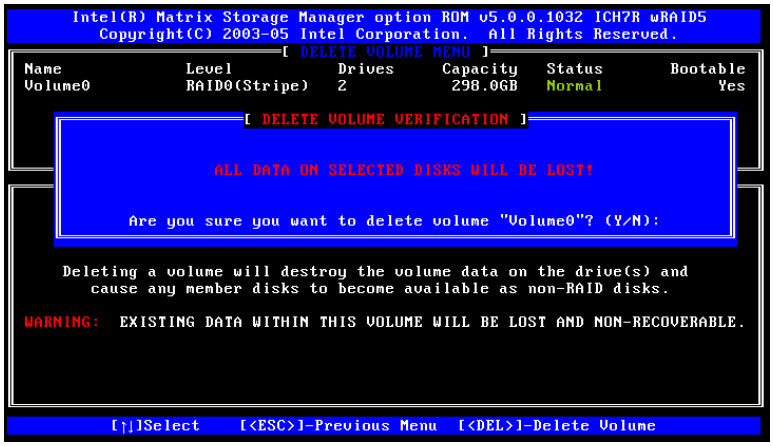
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ DELETE VOLUME MENU ]
Name Level Drives Capacity Status Bootable
Volume0 RAID0(Stripe) 2 298.0GB Normal Yes
[ DELETE VOLUME VERIFICATION ]
ALL DATA ON SELECTED DISKS WILL BE LOST!
Are you sure you want to delete volume "Volume0"? (Y/N):
Deleting a volume will destroy the volume data on the drive(s) and cause any member disks to become available as non-RAID disks.
WARNING: EXISTING DATA WITHIN THIS VOLUME WILL BE LOST AND NON-RECOVERABLE.
[↑↓]Select [<ESC>]-Previous Menu [<DEL>]-Delete Volume

**Figure E-10: Delete Volume Verification**

**Step 4:** **Non-RAID Disks**. After deleting the RAID volume, the disks belonging to the volume will be shown as non-RAID disks. See Figure E-11.

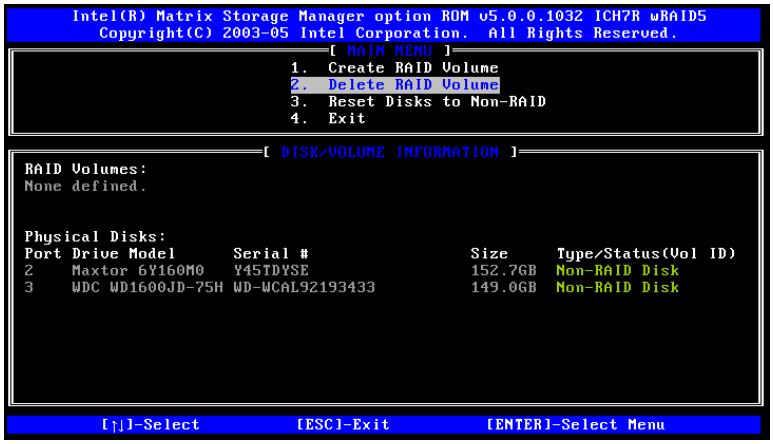
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[ DISK/VOLUME INFORMATION ]
RAID Volumes:
None defined.
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Non-RAID Disk
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Non-RAID Disk
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-11: Non-RAID Disks**

## E.4.3 Resetting a Disk to Non-RAID

**WARNING!**

All data stored on the disk drive of a RAID volume is destroyed when resetting it to non-RAID. Make sure any data to be saved has been moved or backed up before resetting a disk to non-RAID.

**Step 1:** **Select** "**Reset Disk to Non-RAID**." Use the arrow keys to highlight **Reset Disk to Non-RAID** and press **ENTER**. See Figure E-12.

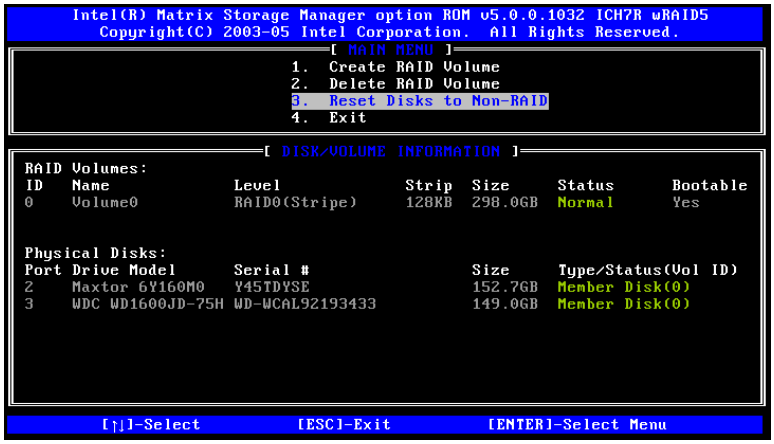
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[ DISK/VOLUME INFORMATION ]
RAID Volumes:
ID Name Level Strip Size Status Bootable
0 Volume0 RAID0(Stripe) 128KB 298.0GB Normal Yes
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Member Disk(0)
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Member Disk(0)
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-12: Reset Disk to Non-RAID Menu**

**Step 2:** **Select Disks to Reset**. Use the arrow keys to scroll through the disk drives and press **SPACE** to select which drives are to be reset as non-RAID. After all the disks to be reset have been chosen, press **ENTER**. See Figure E-13.

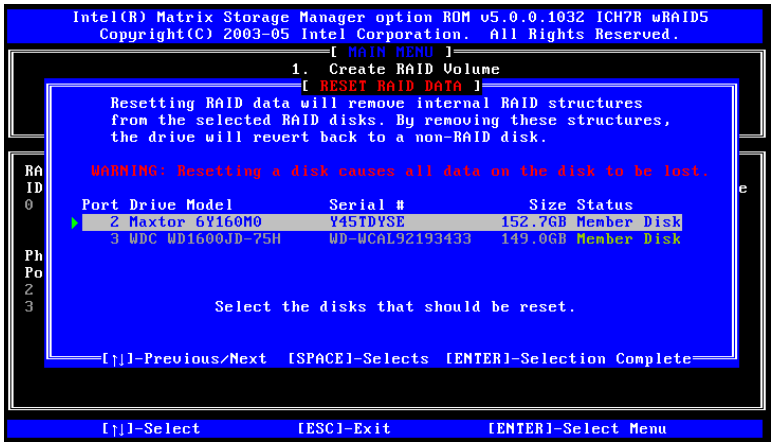
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
[ RESET RAID DATA ]
Resetting RAID data will remove internal RAID structures
from the selected RAID disks. By removing these structures,
the drive will revert back to a non-RAID disk.
WARNING: Resetting a disk causes all data on the disk to be lost.
Port Drive Model Serial # Size Status
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Member Disk
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Member Disk
Select the disks that should be reset.
[↑↓]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-13: Select Disk to Reset**

**Step 3:** **Reset Disk Verification**. After reading the warning, press **Y** to reset the selected disks as non-RAID, or **N** to return to the **Reset RAID Data** menu. See Figure E-14.

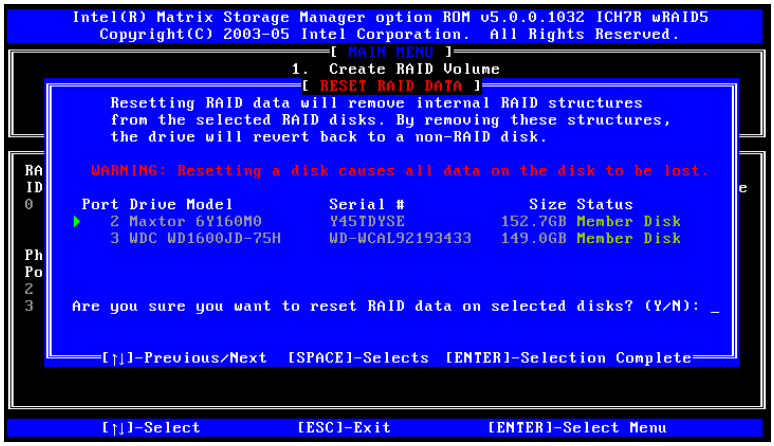
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
[ RESET RAID DATA ]
Resetting RAID data will remove internal RAID structures
from the selected RAID disks. By removing these structures,
the drive will revert back to a non-RAID disk.
WARNING: Resetting a disk causes all data on the disk to be lost.
Port Drive Model Serial # Size Status
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Member Disk
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Member Disk
Are you sure you want to reset RAID data on selected disks? (Y/N): _
[↑↓]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-14: Reset Disk Verification**

**Step 4:** **Disk Drive and RAID Volume Status**. After the disk drives have been reset, the **Matrix Storage Manager Main** menu is shown indicating the status of the RAID volumes and disk drives. See Figure E-15.

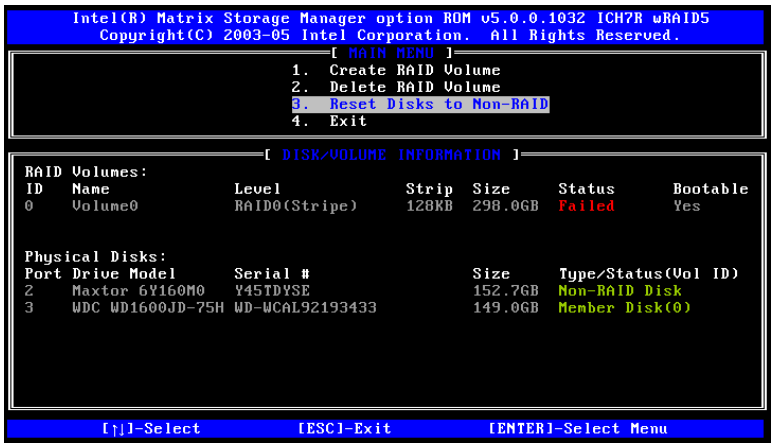
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[ DISK/VOLUME INFORMATION ]
RAID Volumes:
ID Name Level Strip Size Status Bootable
0 Volume0 RAID0(Stripe) 128KB 298.0GB Failed Yes
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Non-RAID Disk
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Member Disk(0)
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-15: Disk Drive and RAID Volume Status**

### E.4.4 Exiting the Matrix Storage Manager

**Step 1:** **Select** "**Exit**." Use the arrow keys to highlight **Exit** and press **ENTER**.

See Figure E-16.

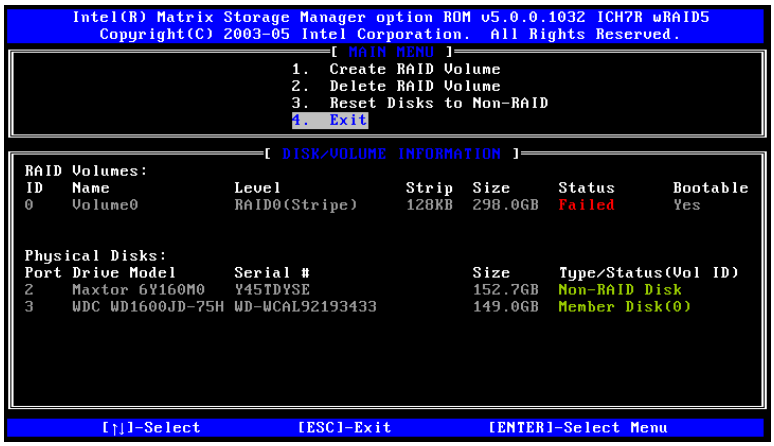
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[ DISK/VOLUME INFORMATION ]
RAID Volumes:
ID Name Level Strip Size Status Bootable
0 Volume0 RAID0(Stripe) 128KB 298.0GB Failed Yes
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Non-RAID Disk
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Member Disk(0)
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-16: Exit Menu**

**Step 2:** **Exit Verification**. Press **Y** to exit the **Matrix Storage Manager**, or **N** to return to the **Main** menu. See Figure E-17.

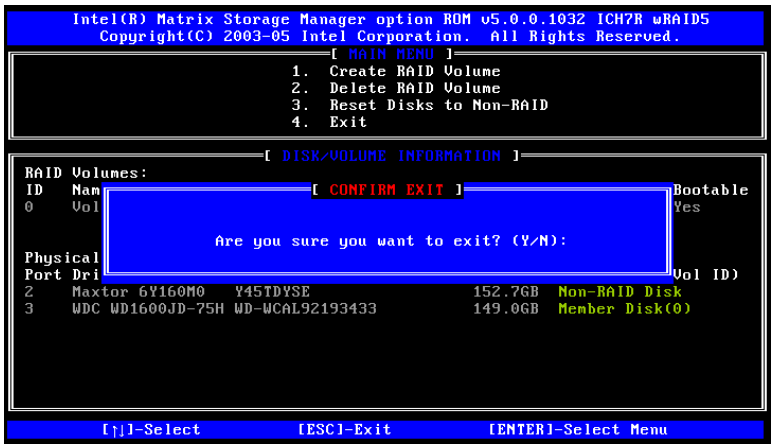
Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICH7R wRAID5
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[ DISK/VOLUME INFORMATION ]
[ CONFIRM EXIT ]
Are you sure you want to exit? (Y/N):
2 Maxtor 6Y160M0 Y45TDYSE 152.7GB Non-RAID Disk
3 WDC WD1600JD-75H WD-WCAL92193433 149.0GB Member Disk(0)
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

**Figure E-17: Exit Verification**

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